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Introduction

The Department of Applied Science is an interdisciplinary, graduate-only department that supports applied research in a broad set of areas. These areas include: combustion and analytical chemistry, robotics and mechatronics, biomedical engineering, biotechnology, geophysics, optics and solar energy, applied computing, electric engineering and telecommunication, plant biology, information quality, environmental research, signal processing, and materials and powder science.

The Department offers two degrees, the Doctor of Philosophy and the Master of Science. Each degree has several emphases, which are explained under the separate programs. Faculty housed in several other Departments in both the College of Science and Mathematics (CSAM) and Donaghey College of Engineering and Information Technology (DCEIT), participate in the various emphasis tracks.

Your graduate education in the Department of Applied Science will be a very different experience from your undergraduate career. Merely meeting or satisfying degree requirements should not be the aim of a quality graduate program. Graduate education is an opportunity to increase your knowledge, to broaden your understanding, and to develop your independent thinking and research capabilities. Consequently, your academic program of study and achievement should reflect a commitment to the discipline and to scholarly standards. While graduate faculty and staff members serve as counselors and assistants, your accomplishments as a graduate student are primarily a result of your own personal ambition and dedication. The success of your graduate education depends on your ability to define goals and to organize and execute a program of study and research needed to meet those goals.

This handbook is intended as a guideline for most of the rules governing the graduate programs within the Department of Applied Science. Graduate students and faculty should familiarize themselves with its content, paying particular attention to Department and University deadlines.

Take time to bookmark these websites in your browsers and make a habit of referring to the sites often. Most questions you have will be addressed either in this handbook or on these websites.

UALR Graduate School Home Page  http://gradschool.ualr.edu/
Department of Applied Science Home Page  http://technologize.ualr.edu/appliedscience/
Master of Science

The Master of Science degree is an interdisciplinary degree designed to advance a student’s knowledge beyond the baccalaureate degree and to teach the student how to approach a research project. The student may either pursue a generic degree in Applied Science or, with sufficient specialized course work, may earn a Masters degree with one of two emphases: applied physics or engineering science.

Program Requirements for Master of Science

Coursework
The Master of Science requires 30 credit hours beyond the baccalaureate degree. The student’s plan of study must be developed in conjunction with the thesis advisor and the advisory committee. Twelve credit hours of master’s thesis (ASCI 8000) are required. A minimum of 18 credit hours in 5000 or 7000 level courses within CSAM or DCEIT must be taken.

To earn an emphasis in applied physics, at least nine credit hours must be taken from recognized physics courses in either the Applied Science department or the Physics and Astronomy department.

To earn an emphasis in engineering science, at least nine credit hours must be taken from recognized engineering courses in either the Applied Science department or the Systems Engineering department.

Transfer of Credit
A maximum of six hours can be transferred from an accredited graduate program. The Applied Science Graduate Coordinator will determine applicability of all transfers.

Thesis and Advisory Committee
The student advisory committee will be composed of four members, including the committee chair, who will be the thesis advisor. The chair and two of the three members must be faculty members from Applied Science, Systems Engineering, or Physics. The at-large member can be any other UALR graduate faculty or Applied Science adjunct faculty. The Applied Science Graduate Coordinator must approve the committee constituency.


Thesis Proposal
At least one year prior to the thesis defense, the candidate must present a proposal for the thesis work to the thesis advisory committee. The Chair of the Advisory Committee will obtain a degree audit from the graduate coordinator and present it to the committee during the thesis proposal oral exam, and inform the student about the minimum number of credits needed to fulfill program requirements prior to graduation.

Thesis Defense
Students will present and orally defend their completed Master's research before the advisory committee. The defense will be open to the public and must be announced at least two weeks in advance. Supervisory or examining committee report forms must be filed at the conclusion of defense with the Applied Science department.
**Academic Standing**

If a student receives one ‘C’ in his/her course-work, he/she will be warned that his academic performance is unacceptable, and he/she will be reviewed by the Applied Science faculty which will suggest corrective action. A student receiving two ‘C’s or either a D or an F in his/her coursework will be dismissed from the program, pending review by the Applied Science faculty.

A student’s academic performance will be considered unacceptable if he/she fails to complete the following requirements in the semester that the student has accumulated program credits as mentioned below.

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Accumulated program credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major advisor selection</td>
<td>9 credits</td>
</tr>
<tr>
<td>Advisory committee formation &amp; proposal</td>
<td>18 credits</td>
</tr>
<tr>
<td>defense</td>
<td></td>
</tr>
<tr>
<td>Defend thesis</td>
<td>45 credits</td>
</tr>
</tbody>
</table>

**Summary of Master of Science Degree Requirements***

(i) Minimum of 30 credit hours beyond BS Degree, composed of:
   a. Minimum of 9 credit hours of graduate course work
   b. Minimum of 9 credit hours of graduate coursework from CSM or DCEIT
(ii) Minimum of 12 credit hours of Master’s Thesis (ASCI 8000)
(iii) Thesis and Advisory Committee (4 members’ total)
(iv) Thesis Proposal
(v) Thesis Defense

**Summary of Graduation Requirements**

Successful completion of an approved program of study with a minimum GPA of 3.0
Successful completion of proposal and oral defense
Successful completion of thesis and oral defense
Successful completion of the writing requirements

*In general, the information in this handbook and the accompanying forms are the student’s responsibility during his/her term in the program. Please refer to the *Graduate Catalog* for official information.*
Doctor of Philosophy

The Department of Applied Science doctoral program serves both the CSAM and the DCEIT. Faculty participating in the doctoral program is drawn from the Departments of Applied Science, Biology, Chemistry, Computer Science, Earth Science, Engineering Technology, Graduate Institute of Technology (GIT), Information Science, Mathematics and Statistics, Physics and Astronomy, and Systems Engineering. Due to the diverse nature of the faculty, the program offers opportunities in interdisciplinary science and engineering areas.

The Doctor of Philosophy in Applied Science is the highest academic degree offered at UALR. It is awarded upon completion of a program of advanced study including a significant original dissertation in applied research or design. Work accomplished without the supervision of an Applied Science doctoral faculty member will not be accepted in lieu of the dissertation requirement. The research must be relevant to the emphasis area in which the student is pursuing a degree.

All emphases have different program requirements. Each emphasis has its own candidacy areas and seminar requirements which are described under the "Program Requirements for the Doctor of Philosophy" section of this Handbook and under “Applied Science” in the UALR Graduate Catalog.

The following emphasis areas are offered: Applied Biosciences, Applied Chemistry, Applied Computing, Applied Physics, Computational Science, Engineering Science and Systems, and Information Quality.

Assistantships and Fellowships

Graduate assistantships (GA), teaching assistantships (TA), research assistantships (RA), and fellowships are available to qualified full time students. To apply, students must send an application for an assistantship.

Students entering the program fall into three categories:

1. Students who are supported by a state-funded graduate assistantship (GA) or teaching assistantship (TA) through the Graduate Institute of Technology (GIT). These students are given a work assignment based on research/teaching/laboratory duties for 20 hours per week in return for receiving the GA or TA stipend. These assistantships pay tuition and provide a stipend for living expenses. Students must pay registration and technology fees, buy textbooks, and purchase support material. Any student supported on a teaching assistantship or a state graduate assistantship shall maintain a full-time graduate student status, minimum of 9-credit hours, should not exceed 12 hours except by approval of department. GA stipends are available for a total of two years for a MS degree student and five years for a Ph.D. degree student. The majority of state support does not include summer support. Students should search for a research mentor prior to the first summer to acquire summer funding.
2. Students who are supported by external grant funding—research assistantships (RA). If a graduate faculty member supports a student who has not yet chosen a thesis topic, the work assignment by the primary investigator will be no more than 20 hours per week.

3. Students supported by fellowships. These fellowships provide support based upon the granting agency.

A student awarded an assistantship must maintain full time graduate student status.

**International Students**

International students whose native language is not English and who do not have a degree from a regionally accredited U.S. institution of higher education must submit a score of at least 550 on the paper-based Test of English as a Foreign Language (TOEFL), or 213 on the computer-based version. It is required to maintain a valid health insurance before the student can register. Students with families are highly recommended to obtain coverage for the entire family.

International students who have questions about visas or other concerns should contact Ms. Allyson Hughes, International Student Advisor, in Stabler Hall, Room 105, or by calling (501) 569-3582.

**Admission Requirements and Grades**

Applicants must possess a bachelor’s degree in an appropriate scientific discipline, such as engineering, chemistry, physics, biology, mathematics, earth science or computer science. They must have an overall undergraduate GPA of 3.0/4.0 scale or 3.3/4.0 for the last 60 credit hours. Applicants must have a minimum combined score on the GRE of 1000 and 4.5. Applicants must possess the prerequisite for all core courses in the intended area of study. Recommendations on a doctoral application for admission to the Applied Science program are made with the collective input of the Applied Science Doctoral faculty. Satisfying minimum requirements for admission by itself does not guarantee admission. Factors that could be involved include, but are not limited to, availability of faculty mentors and financial support in cases where such support is sought by an applicant.

In certain cases, students not meeting these requirements may be admitted on a conditional basis. The conditional student must maintain a minimum GPA of 3.0 in at least twelve CSAM or DCEIT graduate credits in the first year of study to be admitted fully.

If a student receives one ‘C’ in his/her course-work, he/she will be warned that his academic performance is unacceptable, and he/she will be reviewed by the Doctoral Affairs Committee (DAC) which will suggest corrective action. A student receiving two ‘C’s or either a D or an F in his/her coursework will be dismissed from the program, pending review by the DAC.

**Writing Requirement**

An English Writing Proficiency Exam (WPE) is offered each fall term by the Applied Science Department. This exam assesses the student's ability to communicate in a written format. Each student must pass this exam to fulfill graduation requirements. A student who does not pass the WPE is required to take the English Writing Proficiency Laboratory (EWPL). The EWPL is offered each fall term. The student must take the EWPL each fall term until they pass.

**Seminar Requirement**

1. All doctoral students are required to attend the orientation seminar held at the beginning of the Fall semester every academic year.
2. All students registered for 6 credits or more (excluding ASCI 7190) in a semester will need to register for ASCI 7190 in that semester.
3. All students who register for less than 6 credits (excluding ASCI 7190) in a semester will need to register for ASCI 7190 in the Fall semester of the current academic year, and may fulfill the seminar requirement over the entire academic year.
4. The students in Item 3 above can access the seminar offsite (except the orientation seminar) as and when arrangements are made. If they choose that option, then they will have to submit a written report (not less than 2 pages) within a week after the seminar is held.

Students who have completed the minimum ASCI program credit requirements will no longer be required to register for ASCI 7190.
Orientation and Assignment of a Provisional Mentor

During the week prior to the beginning of their first semester, new Ph.D. students will have the opportunity to ask questions of the Applied Science Department Chair. At or prior to this orientation session, the emphasis area liaison or the graduate coordinator will be assigned as the student’s Provisional Mentor. This mentor will act as the student’s temporary advisor until the student has selected their doctoral advisor. Students should meet with their Provisional Mentors as soon as possible to receive instruction in selecting and registering for courses, as well as to take care of all the other aspects required to begin their graduate education at the University. Students should consult regularly with their Provisional Mentors during their first semester concerning progress with coursework, rotations, etc. By the end of the first semester of study, students should have selected their Doctoral Advisors from the Applied Science faculty with doctoral status.

Laboratory Rotations

Ph.D. students must register for ASCI 7x45 Introduction to Research in Applied Science. The purpose of these rotations is to:

- Enable the student to identify a suitable laboratory for thesis/dissertation research
- Expose the student to various disciplines within the Applied Science Ph.D. program and to learn techniques that will be useful in the course of the student's research
- Enable the student to identify faculty who would be suitable members of the student's thesis/dissertation committee.

The rotations aid the student in the selection of a Doctoral Advisor. Rotations can be performed with any faculty member who is participating in the Applied Science graduate program listed on pages 52-57. Students can receive from one to three credit hours for their rotations by registering for ASCI 7145, 7245, or 7345 (Introduction to Research in Applied Science). Upon arrival, students should arrange meetings with individual faculty members to discuss mutual research interests.

At the end of the rotation, the student and the rotation host will meet and discuss progress of the rotation. The student will present the results, either orally or in the form of a written report, to the rotation host. A summary of each rotation will be made in the student’s Annual Graduate Student Progress Report.

If the student has not selected their thesis/dissertation advisor after the first semester of rotations, the student will be required to register again for ASCI 7x45. Failure to perform adequately in the course rotation may result in termination of state assistantship funding.

Program Requirements for the Doctor of Philosophy

All emphases require a minimum of 72 credit hours beyond the baccalaureate degree. Specific requirements depend on the emphasis area chosen and are detailed in those sections. A minimum of eighteen (18) credit hours of graded coursework is required from 5000 and 7000 level courses in CSAM and DCEIT. The student’s plan of study must be developed in conjunction with his/her doctoral advisor and advisory committee. The course on “Introduction to Research in Applied Science” (i.e. ASCI 7145, or ASCI 7245, or ASCI 7345), must be taken, and a grade of “credit” must be obtained.

A minimum of forty-two (42) credit hours in the 9000 level doctoral research/dissertation work is required. The research must be substantial and must extend the state of the art in the student’s chosen field through theoretical development, design or process improvement, or experimental technique.

Summary of Doctor of Philosophy Degree Requirements *
Minimum of 72 credit hours beyond BS degree
Minimum of 18 credit hours graded course work (5000 and 7000 level)
Minimum of 42 credit hours of 9000-level research-dissertation work
Registration in Applied Science Seminar (ASCI 7190) is required every semester (does not count towards the overall credit requirement)
Dissertation and Advisory Committee (a minimum of 5 members)
Candidacy Examination
Ph.D. Dissertation Proposal Oral Examination
Ph.D. Dissertation Defense Examination
Summary of Graduation Requirements

- Successful completion of an approved program of study with a minimum GPA of 3.0
- Successful completion of candidacy examinations
- Successful completion of proposal and oral defense
- Successful completion of dissertation and oral defense
- Successful completion of the writing and seminar requirements

*In general, the information in this handbook and the accompanying forms are the student’s responsibility during his/her term in the program. Please refer to the graduate catalog for official information.

Doctoral Advisor

A student’s thesis or dissertation director must be a faculty participating in the Applied Science graduate program. The selection of a Doctoral Advisor is one of the most important choices students will make during their time in our program. A Doctoral Advisor should be chosen with the intent of not only matching research interests, but also with an eye towards finding an individual with whom the student feels comfortable entrusting his/her educational future. Students also are dependent upon the Doctoral Advisor for financial support of Thesis/Dissertation research and, in many cases, Graduate Assistantships. Therefore, this situation should be clarified with prospective Doctoral Advisors. Both students and prospective Doctoral Advisors should take advantage of the system of program rotations to determine compatibility prior to making a firm commitment to each other. Once a Doctoral Advisor is selected, students should complete the “Selection of Doctoral Advisor” form in the Appendix of this Handbook. The form should be signed by both the Doctoral Advisor and the Applied Science Graduate Coordinator for inclusion in the student’s file. Those students who do not have a Doctoral Advisor by the end of the third semester may be dismissed. Changing Doctoral Advisors after this point is possible, and sometimes advisable, but it usually slows a student's completion of degree requirements. Therefore, this decision should be approached carefully.

Advisory Committee

You should select and meet with your advisory committee prior to the completion of the third semester. The role of this committee is to advise and help direct your academic and research programs. The advisory committee will be composed of a minimum of five members, including the committee chair, who will be the student's doctoral advisor. Four of the five members including the chair must be Applied Science doctoral faculty members. The at-large member(s) may be any other UALR graduate faculty or Applied Science adjunct faculty. The Doctoral Affairs Committee must approve the committee constituency after the initial review by the Graduate Coordinator.

The dissertation subject is selected by the student, with input from the advisory committee, at least two years prior to the oral defense. It must be a scholarly contribution to a major field of applied science in the student's emphasis area, consisting of new important knowledge or a major modification, amplification, or interpretation of existing significant knowledge. The written dissertation format must follow the UALR Graduate School Dissertation and Thesis Guide, which can be obtained from the UALR Graduate School or online at http://www.ualr.edu/gradschool/assets/archive/pdfs/thesisguide.pdf

In the first meeting with the committee, the student also should provide appropriate background material on his/her education to aid committee members in advising the student on course work. The student also should brief the committee on his/her research interest and any thoughts on the Thesis/Dissertation. Obtaining committee consent is essential toward ensuring future success. Subsequently, the student should meet with the committee at least once a year. Regular meetings will ensure that progress is made in accordance with the committee's expectations.

Transfer of Credit

Transferability of credit is determined by the student's advisory committee based upon the applicability of the courses selected for dissertation work and the student's educational goals.

Candidacy Examination

The purpose of the Candidacy Examination is to determine whether the applicant possesses the attributes of a doctoral candidate. The Candidacy Exam will be held twice a year after the start of fall and spring classes. The Candidacy Exam is a comprehensive, written test composed of four subject tests (also known as candidacy areas), each of which must be passed. The student will be tested on topics selected from the Candidacy Subject List in his/her emphasis area. The student
may attempt the Candidacy Exam a maximum of two times and must attempt it in consecutive semesters. A student who has not passed all exams after the second offering will be dismissed from the program.

Students must attempt the exam no sooner than the beginning of the second semester in the program. A student must take the exam at the next opportunity after completion of the candidacy preparation subjects and, in any event, no later than the beginning of the fifth semester in the program. A minimum GPA of 3.0 in graduate course-work and admission to an emphasis area is required to take the examination.

Ph.D. Dissertation Proposal Oral Examination

At least two years prior to the dissertation defense, candidates must present a written proposal in either a National Institutes of Health (NIH) or National Science Foundation (NSF) format for their dissertation work to the advisory committee. The proposal will be given to the advisory committee two weeks in advance of meeting with the committee. The student must orally defend the rationale and experimental procedures for the proposed doctoral dissertation. Students are encouraged to present an open seminar on the proposal prior to meeting with the advisory committee. Students who fail the proposal may be dismissed from the program. The Chair of the Advisory Committee will obtain a degree audit from the graduate coordinator and present it to the committee during the proposal defense, and inform the student about the minimum number of credits needed to fulfill program requirements prior to graduation. Supervisory or examining committee report forms must be filed at the conclusion of defense with the Applied Science department.

Ph.D. Dissertation Defense Examination

In order to complete the requirements for the Ph.D. degree, students will prepare and successfully defend a written dissertation in accordance with the format and procedure dictated by the UALR Graduate School. Students must orally defend their completed Ph.D. research to their advisory committee. The date and location of the defense must be publicized at least two weeks in advance. The first part of this final examination will be open to the public and will consist of an open seminar on the student's research. This will be followed by a closed examination during which the candidate will be examined by the Advisory Committee. This examination will follow guidelines established by the Graduate School. The examination can be wide-ranging, but will usually utilize the student's research as a starting point. At the completion of the examination, the Advisory Committee will vote to either pass or fail the student. If two negative votes are received from committee members, it is considered a failure of the exam. Supervisory or examining committee report forms must be filed at the conclusion of defense with the Applied Science department.

Additional Graduate Program Information

Annual Graduate Student Progress Report

All Ph.D. students in the Applied Science Graduate Program will submit an Annual Graduate Student Progress Report by May 15 each year. The purpose of this report is to ensure that students are making satisfactory progress toward earning their degree. The report should be completed in its entirety every year and approved by the Doctoral Advisor who will verify the information by his or her signature. The report then will be submitted to the departmental administrative assistant who will deliver reports to the Applied Science Chair. It is entirely the student's responsibility to complete the report, with appropriate signatures, by the June 15 deadline.

Academic Standing

The Applied Science Chairman and Graduate Coordinator rely upon the recommendation of the student's Advisory Committee for suggestions regarding that student's status. If academic problems occur in the first year prior to the selection of a Doctoral Advisor, it is the responsibility of the Applied Science Chair or Graduate Coordinator to recommend a resolution to the problem. Normally, a student will be given every opportunity to correct this problem within one year, provided that all other indications (for example, research progress) are positive.

If a student receives one ‘C’ in his/her course-work, he/she will be warned that his academic performance is unacceptable, and he/she will be reviewed by the Doctoral Affairs Committee (DAC) which will suggest corrective action. A student receiving two ‘C’s or either a D or an F in his/her coursework will be dismissed from the program, pending review by the DAC.

In addition, a student’s academic performance will be considered unacceptable if he/she fails to complete the following requirements in the semester that the student has accumulated net program eligible credits/timelines as mentioned below.
<table>
<thead>
<tr>
<th>Requirements</th>
<th>Accumulated program eligible credits/timelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major advisor selection</td>
<td>18 credits</td>
</tr>
<tr>
<td>Dissertation Committee formation</td>
<td>27 credits</td>
</tr>
<tr>
<td>Take Candidacy exams</td>
<td>45 credits</td>
</tr>
<tr>
<td>Defend proposal</td>
<td>63 credits</td>
</tr>
<tr>
<td>Defend thesis</td>
<td>More than minimum of 72 credits and less than 108 credits</td>
</tr>
</tbody>
</table>

### Changing Emphasis Areas after Admission to the Graduate Program

Students are awarded financial support based upon the emphasis area to which they apply. Students who do not pursue a course prescribed by the selected emphasis area will lose their support. For foreign students, a loss of graduate support will impact their ability to support themselves. Additionally, their INS status will be affected.*

When students apply to the graduate program, they select their Ph.D. emphasis areas based on their undergraduate and/or graduate degree. The Department of Applied Science recognizes that every student has a unique background, personal goals, and professional desires. Therefore, an individual's program and course work may bridge between the various emphasis areas to allow a broad-based research program.

The appropriate liaisons and the Applied Science Graduate Coordinator must approve any emphasis area change within the Applied Science Doctoral Program after the student's first semester. Change to a different emphasis area will be discouraged whenever the student would need to take a substantial number of undergraduate courses to prepare for the candidacy requirements in the new emphasis area.

Students who do not pursue the program as outlined in their first semester by the appropriate liaison or in future semesters as outlined by their Ph.D. Advisory Committee will lose their financial support.

* Students who are holding student F-1 visas should check with the International Student Office to ensure that they are not violating any of the conditions of their F-1 visa status.

### Petitioning to Have Requirements Waived

The requirements described in this handbook provide a well-rounded background for all students in areas important to the pursuit of a career in Applied Science. While the described guidelines are to be fulfilled by all graduate students, the Department recognizes that specific cases may arise in which 1.) equivalent requirements (especially course requirements) have been fulfilled recently at a comparable university or, 2.) a student's program would benefit if specific aspects of the Applied Science requirements were modified. If a student feels this to be the case, a formal written petition may be made to the Doctoral Advisory Committee to request waiving or alteration of the Applied Science requirements. Students may petition only once for each issue and, in all cases, sufficient documentation must accompany the request. Petitions should be made in a timely fashion prior to graduation (generally within the first year for M.S. students and the first two years for Ph.D. students).

### Waiving Departmental Course Requirements

An amply documented petition to waive departmental course requirements would include, but would not be limited to: grade received, institution and date the course was taken, a letter from the course instructor if possible, a copy of the course syllabus, a description of general areas covered, a listing of textbooks used in the course, and a letter of support from the student's Doctoral Advisor. Other areas open to petitioning include substitutions in general course area requirements. In all cases, the student should clearly describe why the current requirement would not best fulfill their needs and what would be gained as a result of any changes.

### Graduate Student Travel

The Applied Science Graduate Program encourages student attendance at scientific meetings/workshops. Generally, a student's Doctoral Advisor is expected to provide support for students who are presenting papers/posters at a meeting. Alternatively, students should seek travel grants from an appropriate professional organization.
Code of Conduct for Graduate Students

Graduate students must abide by all relevant standards and rules of the University. You should recognize that there are general ethical standards that you are obligated to follow with respect to activities such as cheating or plagiarism. As employees, there are different standards with respect to the execution of your responsibilities, including the protection of University property. For instance, you should recognize that all research carried out under a sponsoring faculty member legally belongs not to the student, but to the University. Failure to abide by University or Departmental guidelines can result in dismissal from the program. If you are concerned about an ethical situation, you should consult your Doctoral Advisor, the Graduate Coordinator, or the Department Chair.

Leaving the Program

A student may request a temporary leave of absence from the Graduate Program by petitioning the Applied Science Chair. This must be done in writing and should contain appropriate explanations. To re-enter the program, the student must petition the Applied Science Department. Acceptance will depend upon issues such as past performance, funding availability and whether there is an advisor willing to accept the student in his/her laboratory. Students should recognize that without formally requesting and receiving such a Leave of Absence, they are officially terminated by the University any time they do not register for one semester, after which they must officially apply for readmittance to the University. To prevent the need to reapply for admittance, students should register in Applied Science Seminar (171) whenever they are registered for at least one class.

Students may resign from the Graduate Program at any time. To do so, they should write a letter to the Graduate Coordinator stating their intent. It is advised that students contemplating such a move should first consult with their Doctoral Advisor or the Graduate Coordinator before beginning such a process.

Students can be dismissed from a faculty member's research program at any time if the Doctoral Advisor (in consultation with the student's Advisory Committee) determines that the student is not making acceptable progress. Such a dismissal in itself will not constitute dismissal from the Department, but it is the obligation of the student to find an acceptable replacement Doctoral Advisor in the Department within one semester. Students will not be allowed to continue their education with the Department without a Doctoral Advisor. If you find yourself in this situation, you should schedule a session with the Graduate Coordinator to determine the best course of action.

Students can be terminated from the Graduate Program by their Advisory Committee for the following reasons:
1) Failure to meet minimum academic standards
2) Failure to make acceptable progress in their degree work
3) Failure to meet generally acceptable ethical standards of the University
4) Failure on the candidacy or research proposal exam
5) Failure during the thesis/dissertation defense

It is the obligation of the student to ensure that they are complying with University and Departmental guidelines with respect to these aspects of their education. If students are unsure or concerned about their status within the Department, they should consult with their Doctoral Advisor, the Graduate Coordinator, or the Department Chair.

Facilities

Faculty members of the Applied Science graduate program are primarily distributed between the ETAS, EIT, Science Laboratories Buildings, Dickinson Hall, Fribourgh Hall, and the Physics/Astronomy Building. The Applied Science Departmental office is located in room 300 of ETAS. The Graduate Institute of Technology (GIT) is located in room 329 of ETAS. Regular office hours are 8:00 am - 5:00 pm, Monday - Friday.

Department of Applied Science Registration Procedures

- Registration: Obtain a Registration and Advisement form in the Department of Applied Science main office.

- Complete and return the form to the Department of Applied Science main office after the approval of the doctoral advisor. The Registration and Advisement forms are to go through the Applied Science Graduate Coordinator for final
approval. All advising flags\(^1\) are lifted through Applied Science ONLY. The advisement flag is cleared on the computer to allow you to register via BOSS. The white copy is retained as a Departmental record and is filed in your student folder. The pink copy is your record of registration and should be retained. There may be other forms and/or paperwork that you will need to take care of, especially if you are a new student. This is determined by each individual student.

- Drop/Add Course: Obtain a Drop/Add form from Records and Registration, Administration South, room 203. Complete the form, sign it, and return it to Records and Registration. The procedure is then identical to the triplicate registration form.

**Sample Ph.D. Time Table**

<table>
<thead>
<tr>
<th>Year</th>
<th>First Semester</th>
<th>Second Semester</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Year</td>
<td>Orientation Session&lt;br&gt;Meet with Graduate Coordinator - draft a plan of study&lt;br&gt;Take appropriate candidacy preparation courses&lt;br&gt;Complete three rotations as required&lt;br&gt;Select Doctoral Advisor by the end of the semester</td>
<td>Continue course work&lt;br&gt;Submit Annual Progress Report&lt;br&gt;Select Doctoral Advisor by the end of the semester in the event that this was not done in the first semester</td>
<td>Begin Dissertation work</td>
</tr>
<tr>
<td>Second Year</td>
<td>Form and meet with Advisory Committee to plan dissertation work&lt;br&gt;Develop a plan of study and submit to the Doctoral Advisory Committee</td>
<td>Conclude preparatory course work&lt;br&gt;Continue dissertation effort&lt;br&gt;Submit Annual Progress Report&lt;br&gt;Submit finalized Plan of Study to Doctoral Advisory Committee</td>
<td>Concentrate upon dissertation research&lt;br&gt;Prepare for Candidacy Exams</td>
</tr>
<tr>
<td>Third Year</td>
<td>Take Candidacy Exams&lt;br&gt;Prepare and Defend Research Proposal by the third year of Study&lt;br&gt;Take any specialized course work outlined in the Plan of Study&lt;br&gt;Continue dissertation research</td>
<td>Prepare and Defend Research Proposal</td>
<td>Conclude Dissertation research&lt;br&gt;Submit Annual Progress Report in the spring term of each subsequent year</td>
</tr>
</tbody>
</table>

**At least one semester prior to intended graduation, begin writing your dissertation**

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\(^1\) An advising flag is a hold placed on the records of a student who has not turned in the Advisement form. Please note that ONLY the Applied Science department can lift the advising flag.
APPLIED SCIENCE AREAS OF EMPHASIS

APPLIED BIOSCIENCES

Applied Biosciences is an interdisciplinary research and academic emphasis offering advanced degrees through the Department of Applied Science. The emphasis incorporates faculty with research programs in the UALR Departments of Biology and Chemistry. The emphasis is coordinated with the developing biotechnology industry within the state of Arkansas and is aligned with related programs in the University of Arkansas system.

The Applied Biosciences Working Group

The Applied Biosciences Working Group is a group of faculty that acts in an oversight role for the Applied Biosciences emphasis, helping to develop policy governing the program and working to improve the program to the benefit of both faculty and students. The working group is responsible for recommending student admissions and candidates for Graduate Assistantships, overseeing student progress, moderating conflicts between advisors and students when requested and administering other general University and Departmental policies regarding graduate student activities.

Recognizing that science is a cooperative enterprise, the Applied Biosciences working group strives to create a sense of community, cooperation and caring among students and between students, faculty and staff. This is facilitated through participation in seminars, colloquia and special social functions. It is to your advantage to participate fully in all of these activities.

Applied Biosciences and Bioinformatics Seminar Requirement

Attendance at the Applied Biosciences weekly seminar series is mandatory and all graduate students must enroll in ASCI 7192 for one unit each semester. Ph.D. students are required to present two seminars during their academic program. Students are encouraged to present their first seminars during their Research Proposal requirement and their second seminar as part of the final Ph.D. Dissertation Defense examination. Several of the Applied Biosciences and Bioinformatics seminars each semester will be presented concurrently with the DCEIT and CSAM Colloquium.

For information on Candidacy courses, go to the section on CANDIDACY EXAMS.

Applied Biosciences Course Listings*

Required Every Semester
ASCI 7192 Applied Biosciences and Bioinformatics Seminar

Fall Semester Courses (offered every year)
BIOL 5310 Evolution
BIOL 5401 Cell Biology
BIOL 5415 Biometry
BIOL 5419 Plant Physiology
ASCI 7386 Recombinant DNA Methods and Applications
ASCI 7375 Biochemistry of Biological Molecules
ASCI 7387 Genomics

Fall Semester Courses (offered alternate years)
BIOL 5406 Pathogenic Microbiology
BIOL 5413 Immunology

Spring Semester Courses (offered every year)
CHEM 5420 Biochemistry
BIOL 5417 Molecular Biology
BIOL 5418 Biotechnology

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BIOL 7310 Experimental Design in Biology
ASCI 7385 Concepts in Genetic Analysis

Springs Semester Courses (offered alternate years)
BIOL 5403 Comparative Physiology
BIOL 5416 Microscopy
BIOL 5412 Plant Ecology

Special Offerings
CHEM 5399 Special Topics in Chemistry - Molecular Modeling
BIOL 5201 AIDS

Courses Under Development
BIOL 73XX Developmental Biology
BIOL 73XX Virology
BIOL 73XX Statistical Analysis of Molecular Data Sets
ASCI 73XX Bioinformatics and Genomic Analysis

*Refer to the UALR Registration Guide and Class Schedule to confirm course offerings each semester. Satisfy candidacy areas: ¹Physiology, ²Genetics, ³Biochemistry, ⁴Computational Biology, ⁵Ecology and Evolution

Applied Biosciences Course Descriptions

ASCI 7192 Applied Biosciences and Bioinformatics Seminar
Prerequisites: graduate standing, consent of thesis advisor and graduate coordinator. Students, faculty, and invited speakers will present, discuss and exchange ideas on research topics of general interest in the field of Biotechnology. One-hour session per week. Course may be repeated for credit. Graded: credit/ no credit.

ASCI 7298 Recombinant DNA Methods and Applications
Prerequisite: Graduate standing in Applied Science or consent of instructor. A laboratory course which teaches the principles, techniques, and applications of recombinant DNA technology, gene cloning, restriction enzyme methods and nucleic acid sequencing. Discussions emphasize both the basic molecular biology of genes and how the techniques can be applied to understand gene structure and regulation, elucidate gene function, prepare vaccines, etc. Six hours of laboratory per week.

ASCI 7375 Biochemistry of Biological Molecules
Prerequisites: introductory biochemistry course or permission of the instructor. Three, five-week modules providing a critical introduction into the structure and biological functions of nucleic acids, proteins and membranes. Topics in the first section, nucleic acids, include structure-function relationships among DNA, RNA, and proteins during replication, transcription and translation. Topics in the second section, proteins, include the principles of protein folding, function, purification and enzyme kinetics. Topics in the third section, membranes, include mobility of membrane constituents, properties of membrane proteins, mechanisms of membrane transport, membrane synthesis and flow, secretion, receptors and signal transduction.

ASCI 7385 Concepts in Genetic Analysis
Prerequisites: introductory undergraduate genetics or molecular biology course. Methods of genetic analysis including mutant isolation, genetic and physical mapping, receptors genetics, evolutionary mechanisms, molecular variation and genomic evolution.

ASCI 7387 Genomics
Prerequisites: BIOL 3300 Genetics or equivalent or consent of the instructor. The course provides an overview of genomes, the current methods to study genomes, and the function and evolution of genomes. Specific areas and topics that will be discussed include large-scale sequencing projects, genome structure and evolution, genomic variation, and genome-wide analysis of gene/protein expression. Additionally, since advances in genomics are often driven by technology, the course will
familiarize students with current methods being used in the field (e.g., computational approaches to comparative sequence analysis, DNA microarrays, proteomic techniques, etc.). The course will rely on current literature with lectures on basic principles as necessary to give students an introduction to a particular topic.

BIOL 7310 Experimental Design
Prerequisites: Graduate standing and a previous course in statistics, BIOL 4415/5415 Biometry is highly recommended. Experimental design in biology is designed to provide students with an appreciation of the utility of rigorous experimental design and the use of inferential statistics in research with biological systems. Students will be given a background in the statistical requirements of manipulative experiments and will critique research designs in recently published literature. Three credit hours.

BIOL 5401 Cell Biology
Prerequisites: BIOL 1400 or 1401, 12 additional hours in biology, CHEM 1401 or 1403; microbiology is strongly encouraged. A study of the organization of cells as related to the structure and function of biological molecules. Emphasis is placed on eukaryotic cells. Three hours lecture and three hours laboratory per week. Four credit hours.

BIOL 5403 Comparative Physiology
Prerequisites: BIOL 1400 or 1401, 2403, CHEM 1403, or the equivalents. Organ function in a wide range of organisms, including vertebrates and invertebrates. A comprehensive survey of functional relationships in more than one group of animals. Three hours lecture and three hours laboratory per week. Four credit hours.

BIOL 5406 Pathogenic Microbiology
Prerequisites: BIOL 1400 or 1401, 2401, or their equivalents. Survey of pathogenic microbiology, immunology, virology with emphasis on fundamental principles of each science and their application to the diagnosis and control of human diseases. Three hours lecture and two hours laboratory per week. Four credit hours.

BIOL 5413 Immunology
Prerequisites: BIOL 1400 or 1401, 2401, CHEM 1402, 1403. Immunobiology and immunochemistry of humoral and cellular mechanisms of immunity. Three hours lecture and two hours laboratory per week. Four credit hours.

BIOL 5415 Biometry
Prerequisites: 12 hours of biology, environmental health science, or earth science (in combination or singularly); MATH 1302 or higher numbered mathematics course, three hours of statistics, or consent of instructor. Graduate standing required if student enrolled in 5415. A computer based course in experimental design, data analysis and interpretation. The objective of the course is to teach the application of statistical procedures relevant to the academic emphasis of students, not statistics per se. Designed to be especially beneficial to those students planning to seek an advanced degree upon completion of their baccalaureate or to go into quality control or research positions. Two hours lecture and four hours laboratory per week. Four credit hours.

BIOL 5416 Microscopy
Prerequisites: 15 hours of biology. Graduate standing if student enrolled in 5416. A laboratory course in the fundamental theory and practical application of light and electron microscopy including specimen preparation, photomicrography and digital computer image processing and enhancement. Topics include brightfields, darkfield, phase, differential interference contrast, polarized and epic fluorescent light microscopy and scanning and transmission electron microscopy. Strong emphasis is placed on experimental design and use of the microscope as an experimental tool. Two hours lecture and four hours laboratory per week. Four credit hours.

BIOL 5417 Molecular Biology
Prerequisites: 19 hours in biology including both Biology 2401 and 3300; CHEM 1401 or 1403. BIOL 3400 and 4401/5401 are strongly recommended. BIOL 4417/5417 also is recommended or may be taken concurrently. A study of the applied science of biotechnology designed to introduce students to the elements of a biotechnological career. Topics range from traditional biotechnology such as animal and plant tissue culture to contemporary molecular biotechnology and the use of recombinant DNA technology and genetic engineering in research and industry. Emphasis will be placed on current biomedical, pharmaceutical and agri/industrial applications. Graduate students must complete and defend a term paper. Two hours lecture and four hours laboratory per week. Four credit hours.
BIOL 5419 Plant Physiology
Prerequisites: BIOL 1400 or 1401, 2402, CHEM 2450, or their equivalents, or consent of instructor. Study of water relations, nutrition and metabolism including photosynthesis, growth and development. Two hours lecture and four hours laboratory per week. Four credit hours.

CHEM 5420 Biochemistry
Prerequisites: CHEM 2510, 3151 and 3351. Basic chemistry and metabolism of proteins, lipids, carbohydrates and nucleic acids; action of vitamins, hormones and enzymes. Three hours lecture and three hours laboratory per week. Three credit hours.
APPLIED CHEMISTRY

The Applied Science’s Ph.D. provides advanced preparation for careers in government, industrial, and academic research. The degree offers a flexible program of study in order to take advantage of the previous training of each student. The number of required courses has been minimized, placing the responsibility for developing a student’s program upon the student and their advisory committee. Research is the major emphasis of this program. Our faculty members pursue vigorous and productive research programs on a variety of topics, providing graduate students with numerous opportunities to select an area of specialization. Teaching is also a required activity in the program, and graduate students contribute to the teaching mission of the Chemistry Department as TAs (teaching assistants), most often in freshman level laboratories.

The Applied Chemistry Faculty
Participating faculty are from the Department of Chemistry (College of Science and Mathematics) and the Department of Applied Science (Donaghey College of Information Science and Systems Engineering). In addition to their other faculty responsibilities, this faculty directs Applied Chemistry students in doctoral research, serve as members of the student’s supervisory committees, and generally oversee operation of the program. They also serve as supervisors for the work assignments of Ph.D. students supported by a state-funded graduate assistantship. Several faculty are engaged in collaborative research programs, bringing together talents and knowledge from different areas to focus on interdisciplinary problems. Research collaborations exist among this group of faculty, as well as externally with the University of Arkansas for Medical Sciences (UAMS) and the National Center for Toxicological Research (NCTR). Research collaborations outside the central Arkansas area have included NASA-Kennedy Space Center and Oak Ridge National Laboratories.

Students in Applied Chemistry
Participating students are a diverse group, whose academic background represents not only Arkansas and the surrounding region, but also many other states and foreign countries. Students work closely with one another and with faculty mentors, creating a spirit of community and cooperation. This is facilitated through seminars and various social functions. Students are expected to conduct themselves in a professional and ethical manner. A specific goal and benefit of the program is development of the student’s skills in all areas of scientific communication.
For information on Candidacy courses, go to the section on CANDIDACY EXAMS.

Applied Chemistry Course Descriptions

ASCI 7309 Electronics for Scientists  
Prerequisites: advanced mathematics, science, or engineering background or consent of instructor. A course in electronics for those with limited or no previous background. Topics covered include DC and AC circuits, diodes, transistors, ideal operation amplifiers and digital circuits. This course has a major laboratory component. Two hours lecture and three hours lab per week.

ASCI 7399 Special Topics in Applied Science  
Detailed study in applied science and related areas; may be lecture or lecture and laboratory, depending on specific topics. Variable credit of one to three hours. On demand.

CHEM 5251 Organic Preparations  
Prerequisite: CHEM 3151 or 4250. Advanced experiments in organic chemistry using special apparatus and techniques. Two three-hour laboratories per week. On demand.

CHEM 5340 Inorganic Chemistry  
Prerequisite or corequisite: CHEM 3340 and 3371 (the latter may be taken as corequisite). A theoretical treatment of inorganic chemistry to include atomic structure, valence bond, molecular orbital and ligand field theories; the crystalline state; thermodynamic and kinetic aspects of transition metal chemistry. Laboratory will reinforce concepts developed in lecture. Two hours lecture and three hours of laboratory per week. Spring.

CHEM 5350 Intermediate Organic Chemistry  
Prerequisite: CHEM 3351. Reaction mechanisms; correlation of structure with reactivity; literature survey of recent advances in the field. Three hours lecture per week. On demand.

CHEM 5380 Introduction to Polymer Chemistry  
Prerequisites: CHEM 3151 and 3351 or 4250 (recommended, but not required: CHEM 3170, 3271, 3371, 3470 and 3572). Coordination of theoretical and practical aspects; includes history, types of polymerizations, kinetics, molecular weight, physical properties including thermal and spectroscopic characterization, biopolymers and engineering resins. Two hours lecture and three hours of laboratory per week. Even years in the Spring.

CHEM 5399 Special Topics in Chemistry  
Prerequisite: consent of instructor. Topics may include chemical carcinogenesis, environmental chemistry, solid-state chemistry, radiochemistry, macromolecules, surface chemistry, quantum chemistry and others. Three hours lecture per week. On demand.

CHEM 5411 Instrumental Analysis  
Prerequisites: CHEM 2510 and 3351; PHYS 1322 or 2322. Most common modern instrumental methods of analysis; includes topics in spectroscopy, electrochemistry and chromatography. Three hours lecture and one four-hour laboratory per week. Fall.

CHEM 5420 Biochemistry  
Prerequisites: CHEM 2510, 3151 and 3351. Basic chemistry and metabolism of proteins, lipids, carbohydrates and nucleic acids; action of vitamins, hormones and enzymes. Three hours lecture and three hours laboratory per week. Spring.

CHEM 7311 Advanced Analytical Chemistry  
Prerequisite: CHEM 4411/5411 or equivalent. Complex solution equilibria and selected topics in spectroscopy, electroanalytical techniques and separations procedures. Three hours lecture per week.
CHEM 7340 Advanced Inorganic Chemistry
Prerequisite: CHEM 4340/5340 or equivalent. Advanced theoretical concepts; includes atomic structure, molecular and solid structures, bonding, ligand field theory, organometallic chemistry and metals chemistry and reaction mechanisms. Three hours lecture per week.

CHEM 7317, 7318, 7319 Selected Topics in Analytical Chemistry
Prerequisite: consent of instructor. Topics may include electro-analytical techniques, modern functional group analysis, instrumental design and control and others. On demand

CHEM 7347, 7348, 7349 Selected Topics in Inorganic Chemistry
Prerequisite: CHEM 4340/5340. Topics may include magnetochemistry, X-ray crystallography, chemistry of diamond-like semiconductors, chemistry of rare earth elements, chemistry of boron and its compounds, reaction mechanisms and others. Three hours lecture per week. On demand.

CHEM 7350 Organic Reaction Mechanisms
Prerequisites: CHEM 3350 or equivalent and 3351 or equivalent. Reaction mechanisms of classical organic reactions; includes ionic and free radical addition and substitution, oxidation, reduction and elimination reactions. Three hours lecture per week. Fall

CHEM 7351 Modern Synthetic Reactions
Prerequisites: CHEM 3350 or equivalent and 3351 or equivalent. Modern organic reactions and their applications in synthesis. Three hours lecture per week. On demand.

CHEM 7357, 7358, 7359 Selected Topics in Organic Chemistry
Prerequisites: CHEM 3350 and 3351. Topics may include natural products, stereochemistry, photochemistry, heterocyclic compounds, free radicals, carbenes, polymers and others. Three hours lecture per week. On demand.

CHEM 7370 Physical Principles of Chemical Reactivity
Prerequisites: CHEM 3371 or equivalent and 3470 or equivalent. Chemical and physical properties of selected species in terms of thermodynamics, kinetics and molecular structure; examples in scientific literature illustrate how physical chemistry principles may be applied to chemical reactivity. Three hours lecture per week. Spring

CHEM 7371 Chemical Thermodynamics
Prerequisites: CHEM 3371, 3470. Application of the three laws of thermodynamics to chemical systems; relates spontaneity and equilibrium in gaseous, heterogeneous-phase, and solution reactions to thermal and electrochemical measurements. Three hours lecture per week. On demand.

CHEM 7372 Chemical Kinetics
Prerequisites: CHEM 3371 and 3470. Chemical reaction rates; includes determination of empirical rate laws, collision and transition state theories, activation energy and catalysis, reaction mechanisms and kinetic intermediates. Three hours lecture per week. On demand.

CHEM 7377, 7378, 7379 Selected Topics in Physical Chemistry
Prerequisites: CHEM 3371 and 3470. Topics may include quantum chemistry, statistical thermodynamics, semi-empirical molecular orbital calculations, molecular spectroscopy, photochemistry, states of matter, mathematical methods in chemistry and others. Three hours lecture per week. On demand.

BIOL 5417 Molecular Biology
Prerequisites: nineteen hours in biology including both BIOL 2401 and 3300; CHEM 1401 or 1403; BS in biology or permission of instructor. Successful completion of either Biology 3400 or Biology 4401 is strongly encouraged. A study of molecular biology theory and practice. Emphasis is on the study of model systems to understand the current approaches and laboratory techniques necessary to answer basic questions in current molecular biology. Two hours of lecture and four hours of laboratory per week. Spring.
**APPLIED COMPUTING**

The Applied Computing emphasis is customized by the student to focus on hardware applications, software applications or data applications. The student’s research problem will ordinarily be found as part of the research efforts of one of the many multidisciplinary teams at UALR so that the results of the research, regardless of the chosen focus area, may further applications of computing to the sciences, engineering or social sciences. The curriculum is designed to provide the student both breadth across the computing techniques of the three areas and depth in the methods of the focus area. Applied Computing graduate students will come from many computing backgrounds. Therefore, the program in Applied Computing is designed around a common core of computing knowledge that provides a firm foundation regardless of the eventual area of specialization.

**Admission to the Applied Computing Program**

Admission to the Applied Computing program presumes the equivalent experience developed in six undergraduate computing courses, three with a heavy emphasis on programming and data structures, one focused on computer organization or architecture, one on operating systems or networking, and one on database technology. Additional prerequisites may be required for some of the courses in a concentration area. Applicants also must be familiar with single-variable calculus and mathematical statistics. Exposure to Discrete Mathematics is recommended.

**Applied Computing Seminar Requirement**

Attendance at the Applied Computing seminar series is mandatory, and all graduate students must enroll in ASCI 7190 during semesters subsequent to admission.

**Admission to Candidacy**

Admission to Candidacy is earned by passing the Candidacy exam over the Common Core knowledge (hardware concepts, systems software and networking, information storage and retrieval and software engineering) and two courses from a concentration area. A candidate’s graduate five-person committee is comprised of at least three members of the Applied Computing faculty, two of which must be core faculty, and at least one other Applied Science faculty member not in Applied Computing. This committee will interview the candidate and determine when the candidate is prepared to sit for the exam. The committee members will construct and administer the exam and determine passing performance.

A student may choose a dissertation advisor who will assist the student in selecting a dissertation committee as early as the second semester in the Applied Computing emphasis area. The student’s committee will consist of the dissertation advisor, at least two other Applied Computing faculty members, and at least one other Applied Science faculty member not in Applied Computing. The dissertation advisor will chair the dissertation committee, which will approve the remaining coursework and research registrations as the candidate progresses toward fulfilling the Ph.D. requirements. Faculty serving on a candidate’s dissertation committee may be a part of the candidate’s review committee and vice versa.
For information on Candidacy courses, go to the section on CANDIDACY EXAMS.

Applied Computing Course Descriptions

CPSC 7311 Software Engineering
Prerequisites: graduate standing and a working knowledge of C or C++. An overview of the software development paradigm, to include the software life cycle, prototyping, and object-orientation; reliability, quality assurance, formal methods, and CASE tools.

CPSC 7321. Operating Systems
Prerequisites: CPSC 3380 and 3482; working knowledge of C, C++, or Java Programming Language, and UNIX. Advanced topics in operating systems; process synchronization, deadlock, concurrency; fault tolerance, protection and security; distributed operating systems and multiprocessor operating systems.

CPSC 7331. Computer Architecture
Prerequisite: CPSC 3482. A study of computer architecture fundamentals; the impact of technology on architecture cost and performance; Instruction Set Architecture; design and analysis of the building blocks of computer systems, including data path, control, and memory hierarchy; recent architectural developments.

CPSC 7333. VLSI Design
Prerequisite: CPSC 3482. This course introduces the principles of CMOS VLSI technology and design; design methodologies from concept to implementation of VLSI chips; Mentor Graphics and Cadence software packages that support design, layout, and verification.

CPSC 7334. Digital Systems and Hardware Design Languages
Prerequisites: CPSC 3482 and working knowledge of C. Architecture of a representative 32-bit processor, system building blocks, design conventions; HDL languages; modeling, simulation and verification of the representative processor.

CPSC 7341. Telecommunications and Networking
Prerequisites: graduate standing. Fundamentals of data communications; topologies and transmission media; protocol architecture; LAN, MAN, and WAN systems; network design issues.

CPSC 7351. Database Design
Prerequisites: CPSC 2380, 3375 and MATH 2310. Design process, objectives, techniques, syntactic and semantic analysis design; entity relationships model, binary and n-ary relationships, minimality of relations, recursive relationships, role-modeling structures, aggregate objects, conversion methods, implementation models, evaluating design and choosing design methodologies.

CPSC 7373. Artificial Intelligence
Prerequisites: CPSC Science 2380; MATH 1305 or 2304. Undergraduate course work in artificial intelligence would be beneficial but is not required. Study of the major areas of artificial intelligence, including general problem solving, search strategies, heuristics, knowledge representation, machine learning, games, scene analysis, expert systems, robotics, natural language processing, and AI languages.

CPSC 7374. Image Processing
Prerequisites: MATH 1305 or 2304, and a working knowledge of C programming. Study of digital image fundamentals; transformation enhancement, restoration, segmentation, compression, encoding, representation, and description of digital images.

CPSC 7375. Machine Learning
Prerequisites: CPSC 2380; MATH 1305 or 2304. Prior course work in artificial intelligence would be beneficial but is not required. In-depth study of machine learning foundation, neural networks, learning paradigms, inductive learning, deductive
learning, learning techniques, rough classifiers, fuzzy systems, genetic algorithms, lattices, pattern recognition, and applications.

**CPSC 7382. Systems Analysis and Design**
Prerequisite: graduate standing. Analysis and design of computer information services to meet the needs of industries and businesses; intended as a real-world practicum via field study, and as a community outreach via the provision of expertise and training.

**CPSC 7383. Modeling and Simulation**
Prerequisites: CPSC 2380; MATH 1305 or 2304; knowledge of statistics and probability. Performance analysis of models of various systems using analytical approaches, discrete and continuous simulation, and hybrid techniques.

**CPSC 7386. Compiler Design**
Prerequisite: CPSC 2380 and 3383; MATH 2310. Grammars, languages, and the anatomy of compilers: scanners, parsers, semantic analyzers, type systems, run-time environments, intermediate code generation, code generation, and code optimization.
The emphasis area incorporates research programs from the UALR Departments of Applied Science and Physics and Astronomy. Current research areas are listed below with a brief description of each area.

Optics Research
The science of optics and the technology of photonics (generating and harnessing light and other forms of radiant energy whose quantum unit is the photon) are now recognized as critical enablers for information technology and telecommunications, health care and the life sciences, sensing applications in industry and manufacturing, and developments in several areas of national defense. The Applied Optics Laboratory (AOL) at UALR provides research opportunities in the Applied Physics emphasis area for students interested in developing photonic devices for measurements in industry, the environment, aerospace, medicine, and agriculture. Email Dr. Al Adams at ajadams@ualr.edu or phone him at 501-569-3498.

Advanced Image Processing
The scientific objective of this program is an extensive study of galaxies in the nearby Universe using infrared observations made in Arizona in conjunction with data from the Hubble Space Telescope to determine how galaxies evolve over time. The data for infrared imaging of galaxies are acquired at two observatories in Arizona. Observations are obtained with the University of Arizona Steward Observatory 61 inch (1.5m) telescope located on Mt. Bigelow (elevation 8200 ft.) and the Steward Observatory 90 inch (2.2m) telescope located on Kitt Peak (elevation 7000 ft.). Initial results on 45 galaxies are described in the Astrophysical Journal Supplement Series of May 1998 (Grauer, A. D., and Rieke, M.J., 1998, ApJS {Astrophysics Journal Supplement}, 116, 29-45). This work has been supported by grants from the National Science Foundation and Research Corporation. In the past five years, 11 students have accompanied Dr. Grauer to Arizona to take data at the telescope and have done further analysis both at UALR and at the University of Arizona. Email Dr. Al Grauer at adgrauer@ualr.edu.

Applied Geophysics
Geophysics, which combines knowledge from physics, mathematics, and geology, includes exploration and imaging of the earth's interior through physical measurement collected at or near the earth's surface by highly specialized equipment. The research program at UALR is oriented toward the development and application of geophysical technologies for environmental, geotechnical, and engineering applications. Gravity, magnetic, electric, seismic, and ground penetrating radar are the main technologies utilized in the research. Topography and three-dimensional imaging of the shallow subsurface using these technologies is an important research focus. Applied geophysics includes also research in digital signal processing to develop new procedures for infrasonic signal detection and Doppler Radar Wind profiling. Infrasonic detection, used heavily in nuclear monitoring, requires innovative technologies in both software and hardware to improve signal-to-noise ratios and to discriminate between different signals. Doppler Radar Wind profiling mainly is implemented for aviation and space vehicle safety. These projects provide opportunities for students in the Applied Physics and Engineering Science and Systems emphasis areas. Email Dr. Haydar Al-Shukri at hjalshukri@ualr.edu or phone him at 569-3086.

Seismology
The Arkansas Center for Earthquake Education and Technology Transfer is a state funded institution within UALR that has the responsibility for installing and operating the Arkansas Seismic Network. One mission of the center is to conduct scientific research in a wide range of projects in earthquake and nuclear seismology, the New Madrid Seismic Zone, paleoseismology and earthquake risk assessment and mitigation. This Center provides students and faculty with data, facilities and the environment to accomplish their research. Email Dr. Haydar Al-Shukri hjalshukri@ualr.edu or phone him at 501-569-3086.

High Energy Astrophysics
The Very Energetic Radiation Imaging Telescope Array System (VERITAS) Collaboration is the acknowledged world leader in the rapidly growing field of very high energy (VHE) gamma ray astronomy. It has pioneered the imaging technique for rejecting cosmic ray events and has discovered all three of the confirmed Northern Hemisphere sources of VHE gamma rays. The VERITAS Collaboration currently operates the Whipple Observatory 10 m Gamma Ray Telescope in Southern Arizona. An array of seven imaging Cerenkov telescopes is under construction and scheduled for completion in 2005. As an associate member of the VERITAS Collaboration, Dr. Tony A. Hall conducts research in the emission of TEV gamma rays from pulsars, binary systems, supernova remnants and active galactic nuclei. Additional data on X-ray emission
from these sources are obtained from the Rossi x-ray Timing Explorer (RXTE) and Chandra satellites. Email Dr. Tony A. Hall at tahall@ualr.edu or phone him at 501-569-8971.

For information on Candidacy courses, go to the section on CANDIDACY EXAMS.

Applied Physics Course Descriptions

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Prerequisites</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASCI 5310</td>
<td>Introduction to Signal Processing</td>
<td>MATH 3322 or equivalent</td>
<td>Introduction to the fundamental concepts in signal processing. Use of the fundamental transform techniques (Laplace transform, discrete Fourier transform, z-transform). Discrete time representation of signals, linear time invariant systems. Correlation, coherence, and time delays. Standard system models (ARMA, ARMAX). FIR and IIR filters. Three hours lecture. Three credit hours.</td>
</tr>
<tr>
<td>ASCI 5325</td>
<td>Measurement Techniques</td>
<td>SYEN 2315 or equivalent</td>
<td>Principles of operation and implementation of transducers used in electronic measuring systems. Sensors used for the measurement of strain, capacitance, pressure, flow, force velocity, temperature, humidity, vibration, sound, and acceleration are discussed. Interfacing transducers with a digital system will be emphasized. Effects of quantization, scaling, sampling time, and bandwidth will be examined. Two hours lecture and two hours laboratory per week.</td>
</tr>
<tr>
<td>ASCI 5330</td>
<td>Acoustics I</td>
<td>MATH 2453 or equivalent</td>
<td>Development of the equations for acoustics and vibrations. Transducers for measurement of sound and acceleration. Design of sonic actuators using network analysis. Analog and digital processing of signals, including spectral analysis, adaptive signal processing, and cepstral analysis. Applications to noise analysis and control, and machinery diagnosis through sound and vibration measurements. Three hours lecture. Three credit hours.</td>
</tr>
<tr>
<td>ASCI 5335</td>
<td>Mechatronics I</td>
<td>MATH 2453 or equivalent</td>
<td>This course covers basic mechanical design elements, including gears, fasteners, bearings, sprockets and chains, timing pulleys, brakes and clutches. Methods of attaching power and timing elements to shafts, including standard keys, Woodruff keys, splines, pins, and press-fits, are covered. Use of electric motors and pneumatics in mechanical systems is covered. Integration of sensors, including potentiometers, limit switches, and yaw rate sensors is covered. Theories of failure will be introduced, and basic stress/strain calculations will be done. Design theories and project management will be introduced. Three hours lecture. Three credit hours.</td>
</tr>
<tr>
<td>ASCI 5340</td>
<td>Mechatronics II</td>
<td>ASCI 4335 or equivalent</td>
<td>The combination of classical mechanical design, electronic analysis and design, control engineering, and computer science in the design of complex electric-mechanical-controlled systems. Commonly used sensors (Encoders, potentiometers, accelerometers) and actuators (stepping motors, DC motors) are studied. Interfacing sensors and actuators to a microcomputer, discrete controller design, and real-time programming for control using the C programming language. There is a significant, out-of-class project exercise associated with this course. Three hours lecture. Three credit hours.</td>
</tr>
<tr>
<td>ASCI 5350</td>
<td>Analog and Digital Electronics Design</td>
<td>SYEN 2315 or equivalent</td>
<td>Operation of analog, digital integrated circuits. Includes amplifiers, A/D and D/A circuits, active filters, special function circuits as used in computers and instrumentation for measurement and control. Three hours lecture. Three credit hours.</td>
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ASCI 5355 Elastic Wave Theory  

ASCI 5360 Potential Theory  
Prerequisites: MATH 1451, MATH 1452, MATH 2453 and MATH 3322. Solution to Laplace’s equation using different boundary and initial conditions. One-, Two- and three-dimensional equations will be analyzed. Various coordinate system (rectangular, cylindrical and spherical) will be used in the solution of the Laplace function, the Associate Legendre function and orthogonality of the Legendre function.

ASCI 7295 Practical Topics in Science Management  
A survey of practical topics relevant to practicing scientist and engineers such as ethics, project management, and grant writing. While an emphasis is placed on bioinformatics, topics will be of interest to all participating in science and engineering projects. Two credit hours. Cross-listed with BINF 7295.

ASCI 7306 Real-time Embedded Systems  
This course presents technologies for the design and implementation of embedded systems using Linux Operating System (OS). Such technologies include Linux, real-time Linux OS, and real-time embedded application design. Students will learn how to administer Linux OS and how to create a task-specific kernel for their own embedded application. They will learn techniques necessary for developing real-time kernel for their own embedded application. They will learn techniques necessary for developing real-time Linux device drivers, real-time kernel and user space. Students will obtain hands-on experience with embedded software design through course projects. Upon completing this course, students should be able to develop their own embedded applications based on open source software resources.

ASCI 7307 Smart Materials  
Prerequisite: ASCI 4320 or equivalent. This course will deal with the unique nonlinear, hysteretic response of smart materials that arise due to coupling between mechanical and thermal or electric or magnetic fields. Specifically, microstructural characteristics and constitutive modeling of shape memory alloys, ferroelectric materials and ferromagnetic materials will be covered. Use of these smart materials in sensor and actuator design will be addressed.

ASCI 7312 Transducers and Real Time Control  
Prerequisites: ASCI 4335 or equivalent, ASCI 7302, SYEN 1302 or equivalent. Applications of computer techniques for data acquisition, analysis, and real-time control; use of analog-to-digital, digital-to-analog, digital I/O for measurement; C computer language for experiment control; use of standard transduction elements for physical measurements such as position, velocity, acceleration, and force.

ASCI 7315 Micro- and Nano-Fabrication  
Pre-requisites: Consent of instructor. This course will introduce some of the important micro- and nano-fabrication techniques that are mostly used in the areas of microelectronics and nanotechnology. Some of the topics that will be covered include diffusion of impurities, thermal oxidation, ion implantation, optical lithography, thin film deposition, etching, nanolithography, nano-imprinting, growth of nanorods and nanosprings by glancing angle deposition, and growth of carbon nanotubes. During the course, students will become familiar with some of the basic experiments including thin film and glancing angle depositions, etching, and film characterization techniques. The course is intended for graduate students from science and engineering majors.

ASCI 7317 Nanostructural Materials: Physical and Chemical Properties  
Pre-requisites: SYEN 3372 or PHYS 4340 or CHEM 4340 or equivalent. This course introduces students to the area of nanotechnology and the novel properties of the materials built at the nanoscale. The course will cover the main properties of nanomaterials, various methods for synthesis and characterization and the most up-to-date applications from nanoelectronics, advanced materials, bio-medicine, etc. The course is designed for graduate students with a background in chemistry, physics, and engineering.

ASCI 7340 Applied Instrumental Optics
Fundamental concepts in design and implementation of optical principles in analytical instrumentation; solving optics engineering problems; includes electromagnetic wave analysis, reflection and refraction, interference and diffraction, optical waveguides, Fourier analysis, coherence and holography. On demand.

**ASCI 7341 Electro-Optics Instrumentation**  
Prerequisite: Applied Science 7340 or equivalent. Physical principles and operating characteristics of electro-optical devices and systems; gas, chemical, solid state and semiconductor lasers; Gaussian beam optics, laser modulators and scanners; imaging devices; thermal and photon detectors; fiber and integrated optics; nonlinear optical devices. On demand.

**ASCI 7355 Introduction to Geophysics**  
Prerequisite: MATH 1451. Application of geology and geophysics to study the interior of the earth and the development of its surface features.

**ASCI 7360 Applied Geophysics**  
Prerequisite: MATH 3322. Utilization of various geophysical prospecting techniques to explore the upper few kilometers of the earth for natural resources and environmental and engineering problems. Introduce the students to the main methods of geophysical prospecting, instrumentation and fieldwork. Train the students on the planning of the geophysical field experiments, selecting the appropriate equipment for each particular problem, executing the required work and handling the field procedures. Introduce the students to various techniques of reducing geophysical data, forward and inverse modeling and geological interpretation. Spring

**ASCI 7365 Advanced Seismology**  
Computational Science at UALR is an interdisciplinary research and academic emphasis offering a Ph.D. degree through the Department of Applied Science. The emphasis is designed to enable students in a wide variety of scientific fields to become experts at applying computational tools and techniques to their specific disciplines.

Admission to the Computational Science Emphasis Area

Admission to the Computational Science emphasis area requires knowledge of discrete mathematics, differential and integral calculus for single and multivariate functions, linear algebra, differential equations, mathematical statistics, and knowledge of programming through data structures. Additional prerequisites may be required for courses in each concentration area.

Computational Science Seminar Requirement

The Computational Science emphasis area requires that each student register for ASCI 7190 each semester. Attendance at the Applied Science seminar series is mandatory.

Admission to Candidacy

Admission to candidacy is earned by passing the candidacy exam over the four competency knowledge areas, namely: High Performance Computing, Modeling and Visualization, Mathematics and a Discipline-Specific area. A candidate’s graduate advisor must convene a five-person committee comprising at least three members of the Applied Science Computational Science faculty, two of which must be from the core faculty and at least one other Applied Science faculty member not in Computational Science. This committee will interview the candidate and determine when the candidate is prepared to sit for the exam. The committee members will construct and administer the exam and determine performance.

A student may choose a dissertation advisor who will assist the student in selecting a dissertation committee as early as the second semester of matriculation in the Computational Science emphasis area. However, a dissertation committee must be formed once the student is admitted to candidacy. The student’s committee will consist of the dissertation advisor, at least two other Computational Science faculty members, and at least one other Applied Science faculty member not in Computational Science. The dissertation advisor will chair the dissertation committee which will approve the remaining coursework and research registrations as the candidate progresses toward fulfilling the Ph.D. requirements. Faculty serving on a candidate’s dissertation committee may be a part of the candidate’s review committee and vice versa.

For information on Candidacy courses, go to the section on CANDIDACY EXAMS.

Computational Science Course Descriptions

CPSC 7312 Parallel Processing
Prerequisites: graduate standing; CPSC 2380 and IFSC 3482. Concepts of parallel computing, parallel architectures and interconnection networks; parallel programming and applications; basic paradigms and primitives, programming using PVM and MPI; efficient mapping of programs, automatic parallelization of serial code.

MATH 7311 Advanced Linear Algebra
Prerequisites: Mathematics 3312 or equivalent course. Vector spaces, subspaces, linear independence and dependence, basis and dimensions; Linear transformations, null space, rank, isomorphism; Inner product spaces, norms, inner products, orthogonal sets, orthogonal projections, bilinear and quadratic forms; Eigenvalues and eigenvectors, similar matrices, diagonalization, symmetric and Hermitian matrices, Jordan canonical form. Three lecture hours per week.

MATH 7312 Computational Linear Algebra
Prerequisites: MATH 3312 and 4323. LU decomposition; QR factorization; iterative techniques for solving systems of equations and Gauss-Seidel; eigenvalue problems, iterative and direct techniques, the condition number; Lanczos algorithm. Three lecture hours per week.
MATH 7323 Advanced Numerical Analysis I
Prerequisites: MATH 5323 and 7311. Numerical solutions of linear operator equations, some nonlinear systems and optimization methods. Three lecture hours per week.

MATH 7324 Advanced Numerical Analysis II
Prerequisites: Mathematics 7323 and 7325. Numerical analysis of ordinary and partial differential equations. Three lecture hours per week.

MATH 7325 Partial Differential Equations
Prerequisites: MATH 3322 or equivalent course. First-order equations in two independent variables, the method of characteristics, discontinuous and weak solutions; linear second order equations, elliptic equations, hyperbolic equations and parabolic equations; Fourier series. Three lecture hours per week.

MATH 7327 Graph Theory
Prerequisites: MATH 3312 or equivalent course. Graphs and subgraphs; trees; connectivity; Euler tours and Hamiltonian cycles; matchings; planar graphs; directed graphs; networks. Three lecture hours per week.

MATH 7351 Mathematical Statistics II
Prerequisites: Mathematics 7350. Sampling, sampling distributions, order statistics, point estimators and their properties, interval estimators and their properties, test of hypotheses, linear models, nonparametric methods. Three lecture hours per week.

MATH 7355 Sampling Techniques
Prerequisites: Mathematics 7350; Mathematics 7350 may be corequisite with consent of instructor. Simple random sampling; Sampling for proportions; Stratified random sampling; Ratio estimators; Systematic random sampling; Cluster sampling; Acceptance sampling. Three lecture hours per week.

MATH 7399 Selected Topics in Applied Mathematics
Prerequisites: Consent of the instructor. Topics in mathematics, applied mathematics, and numerical analysis may include discrete mathematics; ordinary, partial differential equations; integral transforms; complex variables; optimization techniques, linear algebra; approximation theory; topology; geometry; abstract algebra; number theory. Topics in statistics may include statistical inference, sampling, linear models, biostatistics, stochastic processes, statistical computing. May be repeated for credit when topic changes. On demand.
ENGINEERING SCIENCE AND SYSTEMS

UALR Engineering Science and Systems is an interdisciplinary engineering research and academic emphasis offering the Masters and Doctoral degrees through the Department of Applied Science. The emphasis is supported by faculty from the UALR Departments of Applied Science, Systems Engineering, and Engineering Technology. The emphasis goals are to perform high quality engineering research in the areas of mechatronics and robotics, telecommunications, combustion engineering, and materials engineering. The emphasis is designed to allow students to pursue non-traditional research by combining engineering with developing areas such as information science and biotechnology. The opportunity exists to broaden the engineering education by taking supplementary or advanced courses in chemistry, physics, or biology.

Curriculum

Students are required to take a minimum of 15 credit hours in engineering related graduate courses. Most 5000 or 7000 level course in Applied Science and all 5000 level courses in Systems Engineering satisfy this requirement.

Most students who enter the program with a BS in an engineering discipline will take 5000 level, candidacy preparation courses for their first two to three semesters. They may take one or two junior or senior level courses to remediate in an area of weakness. Once the student is ready, he will begin his advanced doctoral studies in the third or fourth semester.

Students who enter the program with an MS in an engineering degree will generally be ready to take the candidacy exams immediately. They should spend their first semester acclimating to the University and preparing for the exams. These students will usually take one semester of 5000 level courses. They will begin their advanced doctoral studies by the second or third semester.

Students who enter the program with a BS or MS in a non-engineering field, such as Physics, Mathematics or Chemistry, should expect to undergo some remediation. These students should be prepared to take 5000 level engineering courses no later than their third semester. They must be prepared to take the candidacy exams by the beginning of the fifth semester.

For information on Candidacy courses, go to the section on CANDIDACY EXAMS.
ASC1 5308 Linux Systems Programming
Prerequisite: CPSC 2376 or equivalent. This course introduces the fundamental structure and services of the Unix/Linux operating systems. Upon completion of this course, the students should master application software and middle-ware design in Unix/Linux operating system through programming at the system call level. It covers files and directories, device control, terminal handling, processes and threads, inter-process communication, event-driven and signal handling, pipes, sockets, client/sever. It also covers graphics and user interface design.

ASC1 5310 Introduction to Signal Processing.
Prerequisite: MATH 3322 or equivalent. Introduction to the fundamental concepts in signal processing. Use of the fundamental transform techniques (Laplace transform, discrete Fourier transform, z-transform). Discrete time representation of signals, linear time invariant systems. Correlation, coherence, and time delays, Bode plots, poles and zeros, state space. Standard system models (ARMA, ARMAX). FIR and IIR filters. Three hours lecture. Three credit hours.

ASC1 5315 Advanced Dynamics

ASC1 5320 Continuum Mechanics
Prerequisite: MATH 2453 or equivalent, PHYS 2321 or equivalent. This introductory course on Continuum Mechanics will take a unified approach to train the student in the modeling of deformation in solids, fluid flow and electric fields. Using a first principles approach, the fundamental conservation laws of mass, charge, momentum and energy will be covered. Applications to deformation in solids, heat transfer, fluid flow and electric fields will be addressed. Three hours lecture. Three credit hours.

ASC1 5325 Measurement Techniques
Prerequisite: SYEN 2315 or equivalent. Principles of operation and implementation of transducers used in electronic measuring systems. Sensors used for the measurement of strain, capacitance, pressure, flow, force velocity, temperature, humidity, vibration, sound, and acceleration are discussed. Interfacing transducers with a digital system will be emphasized. Effects of quantization, scaling, sampling time, and bandwidth will be examined. Two hours lecture and two hours laboratory per week.

ASC1 5330 Acoustics I
Prerequisite: MATH 2453 or equivalent. Development of the equations for acoustics and vibrations. Transducers for measurement of sound and acceleration. Design of sonic actuators using network analysis. Analog and digital processing of signals, including spectral analysis, adaptive signal processing, and cepstral analysis. Applications to noise analysis and control, and machinery diagnosis through sound and vibration measurements. Three hours lecture. Three credit hours.

ASC1 5335 Mechatronics I
Prerequisite: MATH 2453 or equivalent, PHYS 2321 or equivalent. This course covers basic mechanical design elements, including gears, fasteners, bearings, sprockets and chains, timing pulleys, brakes and clutches. Methods of attaching power and timing elements to shafts, including standard keys, Woodruff keys, splines, pins, and press-fits, are covered. Use of electric motors and pneumatics in mechanical systems is covered. Integration of sensors, including potentiometers, limit switches, and yaw rate sensors is covered. Theories of failure will be introduced, and basic stress/strain calculations will be done. Design theories and project management will be introduced. Three hours lecture. Three credit hours.

ASC1 5340 Mechatronics II
Prerequisite: ASCI 4335 or equivalent. The combination of classical mechanical design, electronic analysis and design, control engineering, and computer science in the design of complex electric-mechanical-controlled systems. Commonly used sensors (Encoders, potentiometers, accelerometers) and actuators (stepping motors, DC motors) are
studied. Interfacing sensors and actuators to a microcomputer, discrete controller design, and real-time programming for control using the C programming language. There is a significant, out-of-class project exercise associated with this course. Three hours lecture. Three hours credit.

ASCI 5345 Microcontrollers
Prerequisite: SYEN 2315 or equivalent or consent of instructor. Experimental, project-oriented architecture, programming, interfacing, design of systems based on single chip microcontroller. Three hours lecture. Three credit hours. On demand.

ASCI 5350 Analog and Digital Electronics Design (Pending)
Prerequisite: SYEN 2315 or equivalent. Operation of analog, digital integrated circuits. Includes amplifiers, A/D and D/A circuits, active filters, special function circuits as used in computers and instrumentation for measurement and control. Three hours lecture. Three credit hours.

ASCI 7118 Research Ethics in Science and Eng.
The course uses a case-based method to cover various topics related to professional research ethics. It is intended for entering science and engineering graduate students in the Donaghey College of Engineering and Information Technology (DCEIT). The purpose of the course is to familiarize students with professional ethics related to research and to prepare them to deal with typical ethical situations that may occur in the course of their graduate studies and professional careers.

ASCI 7145, 7245, 7345 Introduction to Research in Applied Science
First semester orientation course to allow new students in the applied science doctoral program to work in a number of faculty research areas. This course will aid the student in the selection of his/her doctoral research director. Variable credit of one to three hours. Offered on demand.

ASCI 7189, 7289, 7389. Research in Instrumentation
Design, research in basic, applied instrumentation; requires laboratory research project involving instrumentation characterization or development. F,S

ASCI 7190 Applied Science Seminar
Prerequisites: graduate standing, consent of thesis advisor and graduate coordinator. Students, faculty, and invited speakers will present, discuss, and exchange ideas on research topics of general interest. Credit must be received at least one semester before enrollment in the last research semester. One hour session per week. Course may not be repeated for credit. Graded credit-no credit.

ASCI 7191,7291, 7391. Cooperative Education in Applied Science
Prerequisite: full time attendance for one semester in the applied science program with a GPA of 3.00 or better and the approval of the major professor and the graduate coordinator. Complements the classroom experience by allowing the student to apply the concepts of instrumentation in the work place. Minimum of one 10 week summer term. Written report, minimum of 200 hours work per credit hour are required. The exact number of hours, and the nature and responsibilities of the work will be specified in writing by the student, the sponsoring faculty member, and the employer. The course may be repeated for credit. The course cannot be used for credit toward the requirements for an applied science degree. Su

ASCI 7307 Smart Materials
Prerequisite: ASCI 4320 or equivalent. This course will deal with the unique nonlinear, hysteretic response of smart materials that arise due to coupling between mechanical and thermal or electric or magnetic fields. Specifically, microstructural characteristics and constitutive modeling of shape memory alloys, ferroelectric materials and ferromagnetic materials will be covered. Use of these smart materials in sensor and actuator design will be addressed. Three hours lecture. Three credit hours.
ASCI 7310 Electronic Circuits for Advanced Instrumentation II  
Prerequisite: Applied Science 7302 or consent of instructor. Methods of modulation and demodulation, phrase-locked loops, frequency synthesis, multipliers, dividers, mixers, modulators; types of noise in circuits, low-noise design, lock-in amplifiers, synchronous detection, signal averaging. Three hours lecture. Three credit hours. Fall

ASCI 7311 Advanced Signal Processing  
Prerequisite: ASCI 4310/5310 or consent of instructor. Power spectrum estimation methods: classical (Welch, periodogram, Bartlett), parametric (auto-correlation, covariance, Burg, linear prediction) and non-parametric (minimum variance). Sinusoidal frequency estimation (MUSIC and Pisarenko methods). Adaptive signal processing, LMS and Newton algorithms, applications of adaptive signal processing (adaptive interference canceling, noise cancellation). Digital signal processing using the Motorola DSP56002, FIR and IIR filtering on the DSP56002 processor. Three hours lecture. Three credit hours.

ASCI 7312 Transducers and Real Time Control  
Prerequisites: ASCI 4335 or equivalent, ASCI 7302, SYEN 1302 or equivalent. Applications of computer techniques for data acquisition, analysis, and real-time control; use of analog-to-digital, digital-to-analog, digital I/O for measurement; C computer language for experiment control; use of standard transduction elements for physical measurements such as position, velocity, acceleration, and force.

ASCI 7315 Micro- and Nano-Fabrication  
Pre-requisites: Consent of instructor. This course will introduce some of the important micro- and nano-fabrication techniques that are mostly used in the areas of microelectronics and nanotechnology. Some of the topics that will be covered include diffusion of impurities, thermal oxidation, ion implantation, optical lithography, thin film deposition, etching, nanolithography, nano-imprinting, growth of nanorods and nanosprings by glancing angle deposition, and growth of carbon nanotubes. During the course, students will become familiar with some of the basic experiments including thin film and glancing angle depositions, etching, and film characterization techniques. The course is intended for graduate students from science and engineering majors.

ASCI 7317 Nanostructural Materials: Physical and Chemical Properties  
Pre-requisites: SYEN 3372 or PHYS 4340 or CHEM 4340 or equivalent. This course introduces students to the area of nanotechnology and the novel properties of the materials built at the nanoscale. The course will cover the main properties of nanomaterials, various methods for synthesis and characterization and the most up-to-date applications from nanostructures, advanced materials, bio-medicine, etc. The course is designed for graduate students with a background in chemistry, physics, and engineering.

ASCI 7320 Introduction to Process Instrumentation and Control I  
Equations of fluid mechanics, thermodynamics, heat transfer as applied to process instrumentation, measurement, control. Three hours lecture. Three credit hours. Fall

ASCI 7321 Introduction to Process Instrumentation and Control II  
Prerequisite: Applied Science 7320 or consent of instructor. Fundamentals of control; includes methods of system analysis, design of analog feedback control systems, simulation and performance criteria. Three hours lecture. Three credit hours. Spring

ASCI 7322 Advanced Process Control I  
Prerequisite: Applied Science 7321 or consent of instructor. Principles of modern control theory; includes state variable analysis and design of control systems, Liapunov stability analysis, optimal and adaptive control, auto- and self-tuning controllers; modern techniques of control, such as statistical process, personal computer-based distributed control. On demand

ASCI 7323. Advanced Process Control II  
Prerequisite: Applied Science 7321 or consent of instructor. Continuous, discrete signal analysis, processing; system modeling using z-transforms, state variables; discrete system stability analysis; control system design using digital filters, PID controllers. Three hours lecture. Three credit hours. On demand
ASCI 7370 Acoustic Analysis and Measurement
Development of the equations for acoustics and vibrations. Transducers for measurement of sound and acceleration. Design of sonic actuators using network analysis. Analog and digital processing of signals, including spectral analysis, adaptive signal processing, and cepstral analysis. Applications to noise analysis and control, and machinery diagnosis through sound and vibration measurements. Three hours lecture per week. Three hours lecture. Three credit hours. Fall

ASCI 7380 Biomedical Instrumentation
Principles of biomedical instrumentation; special constraints in safety, signal transduction, signal-to-noise ratio; special problems in medical instrument design; includes Food and Drug Administration regulations, electrical processing, data acquisition; medical instrument design case studies; emphasis on theory, common difficulties, present research directions of bioinstrumentation design; requires laboratory assignments, major laboratory project. Three hours lecture. Three credit hours. On demand

ASCI 7381 Physiological Measurement Techniques
Principles, physiology, physics, instrumentation of modern physiological measurements; includes measurements of electrocardiogram, pulmonary function, metabolic rate, blood flow, human performance; ultrasonic imaging, stress tests, impedance cardiology; emphasis on theory of each technique’s measurement difficulties, present research directions; requires proposal of a technique that overcomes some disadvantages of existing methods. Three hours lecture. Three credit hours. On demand

SYEN 5320 Linear System Theory
Prerequisite: SYEN 3364, MATH 3312. Linear discrete and continuous time systems, state equations, transition matrix, internal stability, Lyapunov stability, controllability, observability, realization, linear feedback, state observation, polynomial fraction description, geometric theory, discrete time stability, reachability, observability, realization, state feedback and observation. Three hours lecture. Three credit hours.

SYEN 5325 Fuzzy Logic in Control and Systems Engineering
Prerequisite: SYEN 3364. Introduction, basic concepts of fuzzy logic, fuzzy sets, fuzzy relations, fuzzy If/Then rules, fuzzy implications and approximate reasoning, fuzzy logic in control theory, hierarchical intelligent control, fuzzy logic applications in information systems, fuzzy model identification, neuro-fuzzy systems and genetic algorithms. Three hours lecture. Three credit hours.

SYEN 5329 Robust and Optimal Control
Prerequisite: SYEN 4320/5320. Fundamentals of linear systems, signal, and system spaces, power and spectral norms, feedback structure, internal stability, coprime factorization, Bode’s gain and phase relations, observability, controllability, balanced realizations, model reduction, model uncertainty, small gain theorem, controller parameterization, existence of stabilizing controllers, \( H^\infty \) optimal control, synthesis of state feedback via LMIs, and \( H^\infty \) control, and uncertain systems. Three hours lecture. Three credit hours.

SYEN 5330 Computer Architecture
Prerequisites: SYEN3330, 3310. Design principles for computer systems. Number representation, descriptions for computer arithmetic, computer system organization, control structures, including microprogrammed control, memory organization, input/output structures, and introduction to parallel processing. Three hours lecture. Three credit hours.

SYEN 5343 Networks and Combinatorial Optimization
Prerequisites: SYEN 3312 or consent of the instructor. Depth study of combinatorial programming and network optimization. Emphasis on discrete optimization and specialized solution techniques that are efficient way to solve mixed-cost flow, networks with gain, multi-commodity flow networks, networks with gain, multi-commodity flow networks, networks with side constraints and Lagrangian relaxation. Computational complexity is also discussed. Three hours lecture. Three credit hours.
**SYEN 5353 Advanced Digital Communications**  
Prerequisites: SYEN 3154, 3354. In-depth examination of wireless digital communication design strategies. Topics covered include digital modulation, radiowave propagation characteristics, signal detection methods, BER performance improvement and simulation techniques, RF/hardware architectures, migration path for modulation and demodulation techniques, signal processing building blocks for wireless systems, method for mitigating wireless channel impairments, perform system simulations, BER and channel models, predict system performance and evaluate tradeoffs, list TDMA and CDMA techniques, and 3G evolution, describe design issues for wireless systems, particularly those issues in which transmit and receive implementation affect system performance. Three hours lecture. Three credit hours.

**SYEN 5356 Electromagnetic Waves and Antennas**  

**SYEN 5366 Advanced Digital Systems**  
Prerequisites: SYEN 3330, 3130. Advanced design principles for digital systems. Hardware modeling in the hardware description language VHDL (Verilog Hardware Description Language), compilation techniques for hardware models, and logic-level synthesis and optimization techniques for combinational and sequential circuits. Three hours lecture. Three credit hours.
INFORMATION QUALITY

Information Quality is an emerging discipline of growing important as business and government operations, decisions, and planning increasingly rely on information products. The Information Quality emphasis of the Applied Science Ph.D. program is designed to prepare the leaders of tomorrow to advance this rapidly developing area of study. The program will provide advanced preparation for careers in government, industrial and academic research, and teaching. The curriculum is designed to accommodate students from a wide variety of backgrounds by requiring a common core of information quality and technical knowledge while providing an opportunity for specialization in one of the many areas of research including information integration; entity and identity resolution; information mining and extraction; data provenance; data curation; information integrity; information governance, risk, and compliance; enterprise architecture; master data management; e-commerce; and the application of high-performance computing to information quality management.

Admission to the Applied Information Quality Program

Admission to the Information Quality program requires knowledge of computer programming, database systems, and applied statistics.

Applied Information Quality Seminar Requirement

Students must register for the Applied Science Seminar course (ASCI 7190) each semester of residency. Attendance is mandatory.

Admission to Candidacy

Admission to candidacy is earned by passing the candidacy examination over the four competency knowledge areas: Information Quality Theory, Total Quality Management and Statistical Quality Control, Information System Analysis, and Database Systems.

For information on Candidacy courses, go to the section on CANDIDACY EXAMS.

Information Quality Course Descriptions

INFQ 7303 Principles of Information Quality
Prerequisites: IFSC 2300 or equivalent. This course provides a rigorous exploration of information quality concepts, assessment, and problems in organizational information systems, databases and data warehouses. A combination of state of the art literature review and hands-on projects is used to develop knowledge and ability to meet objectives.

INFQ 7318 Total Quality Management and Statistical Quality Control
Prerequisites: STAT 3352 or equivalent. This course provides an understanding of how the concepts and techniques of Total Quality Management may be applied to information products. Topics include continuous improvement strategies, statistical process control, experimental design, capability analysis, quality cost assessments, benchmarking, acceptance testing, and auditing.

INFQ 7322 Information Quality Theory
Prerequisites: INFQ 7303 and INFQ 7318. This course is designed to provide students with the theoretical foundations critical for developing a deep understanding of the state-of-the-art information quality research from the technical, organizational and strategic perspectives. This course will prepare students to work on their thesis, project, and conduct research in the field of information quality. More specifically, students will be exposed to concepts, principles, tools, and models, and techniques that are essential for information quality definitions, measurement, analysis, and improvement. Additionally, students will be exposed to most current, cutting-edge research that go beyond current industry practice in information quality.
INFQ 7337 Project and Change Management  
Prerequisites: INFQ 7303 and INFQ 7318. A course on how to manage information quality improvement projects within an organizational context, including the processes related to initiating, planning, executing, controlling, reporting, and closing a project. Additional topics include identifying project champions, working with user teams, training, documentation, project integration, scope, time, cost-benefit studies, risk analysis, and change management.

INFQ 7342 Information Quality Tools and Industry Landscape  
Prerequisites: INFQ 7303 and INFQ 7318. This course is designed to develop and increase capability and skills that students need to critically understand what IQ software tools, techniques, and prototypes are currently used in industry, government, and research laboratories. The course will prepare students to make software tool recommendations on corporate data quality programs. Students will conduct a survey of academic literature and industry practices in terms of IQ tools such as data cleansing, profiling, and auditing, and will participate in a hands-on workshop on commercial IQ tools from participating vendors in the field.

INFQ 7353 Case Studies for Information Quality Professionals  
Prerequisites: INFQ 7322 and INFQ 7342. This intensive and interactive course is designed to develop and increase the student’s capability and skills to critically understand what constitutes data quality, how to analyze and solve data quality problems, and how to institutionalize data quality projects in an organization where data quality is not the most critical priority.

INFQ 7367 Information Quality Policy and Strategy  
Prerequisite: INFQ 7322. This course explores the top management, strategic perspective for aligning competitive strategy, core competencies, and information quality. Topics include the development and implementation of IQ policies and plans to achieve organizational goals; how to define systems that support the operational, administrative, and strategic IQ needs of the organization, its business units, and individual employees; approaches to managing technology and the information systems function in organizations, role of the CIO.

IFSC 5325 Data Mining Concepts and Techniques  
Prerequisite: IFSC 3330 or equivalent. This course provides in-depth, practical coverage of essential data mining topics, including OLAP and data warehousing, data preprocessing, concept description, association rules, classification and prediction, and cluster analysis. In addition, advanced topics such as mining object-relational databases, spatial databases, multimedia databases, time-series databases, text databases, the World Wide Web are covered.

IFSC 5330 Database Security  
Prerequisite: IFSC 3330 or equivalent. Focus on security issues in databases systems and introduction of how current and future commercial systems may be designed to ensure secrecy and confidentiality. Topics include security models, basic security mechanisms and software, statistical database security, intrusion detection, security models for next generation databases, tested techniques and proven strategies for securing an Oracle environment - from the operating system to the database to the network, and how to implement security using Oracle's built-in tools.

IFSC 5345 Information Visualization  
Prerequisite: IFSC 2300 and MATH 1304 or equivalent. The design and presentation of digital information. Use of graphics, animation, sound, visualization software, and hypermedia in presenting information to the user. Methods of presenting complex information to enhance comprehension and analysis. Incorporation of visualization techniques into human-computer interfaces.

IFSC 7310 Information Systems Analysis  
Prerequisite: IFSC 2300 or equivalent. Methods of problem identification and definition, data collection and measurement, feasibility study methods, work measurement techniques, task analysis, simulation
studies, impact analysis, evaluation methods, forms and display design, proposal writing, documentation and programming standards, design strategies, documentation, and evaluation.

**IFSC 7320 Database Systems**
Prerequisite: IFSC 3320 or equivalent. Database systems and data modeling, including entity-relationship model, relational data model, normalization, structured query language (SQL), transaction management, object-oriented databases, and basics of physical database design and query evaluation.

**IFSC 7325 Advanced Data Mining**
Prerequisite: IFSC 3320 or equivalent. Advanced techniques for knowledge discovery and data mining from large databases, graphical and kernel-based machine learning, active and online learning, mining with uncertainty, spatial and temporal data mining, data mining large micro array and protein array data sets.

**IFSC 7360 Data Protection and Privacy**
Prerequisite: Graduate standing. This course considers the current status of data, information and privacy protection policies, laws and technologies. At the core is the variety of issues concerning informational privacy, i.e. the gathering, creating, storing, use and protection of information and data about individuals. Topics include the economics of data and privacy protection vis-à-vis the right of access to information, control, ownership, free flow, accuracy and use of information; commercial uses of personal information such as data mining and other marketing techniques, as well as the roles of government and the private sector in this setting. Newer information technologies, data mining, security measures, genetic tests and bio-banks worldwide have raised important issues and questions.
CANDIDACY EXAMS

You need to get approval from the Graduate Coordinator before taking the candidacy exams. Use
the simple steps below to decide on the courses you would like to be tested on, fill up the “Candidacy
exam request form” at the end of this handbook (you can get it in electronic form from the Applied
Science Office) and email the form to the Graduate Coordinator.

Steps to select candidacy courses:

1. Consult the table below that is specific to your emphasis area.
2. Select four candidacy subjects you want to be tested on.
3. For each candidacy subject, select a candidacy course you want to be tested on. You must have taken
these courses here at UALR before taking the corresponding candidacy exams. However, a one-time
waiver may be granted. See the end of this section for details.
4. Take exams in all four candidacy subjects in one semester (no exceptions). If you pass all four exams,
you are done. If you fail one or more exams, you will have only one more chance to pass the exams in
the semester immediately following the semester you took the exams for the first time. Exams that
you passed in the first attempt do not have to be retaken.
5. If you fail one or more candidacy subject(s), you may retake the exam in the same subject(s) or other
candidacy subject(s) that was (were) not part of the original four within the emphasis area.

<table>
<thead>
<tr>
<th>CANDIDACY COURSES</th>
<th>Organismal Functions</th>
<th>Cellular Function</th>
<th>Genetics</th>
<th>Biochemistry and Molecular Biology</th>
<th>Biological Modeling and Analysis</th>
<th>Ecological Interactions</th>
<th>Discipline-Specific Applications</th>
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</thead>
<tbody>
<tr>
<td>BIOL 5403</td>
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<td>BIOL 5418 Molecular Biology</td>
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<td>BIOL 7311 Behavioral Ecology</td>
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<tr>
<td>Comparative</td>
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<td>BIOL 5415 Biometry</td>
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<td>Physiology</td>
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<td>BIOL 5401</td>
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<td>Cell Biology</td>
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<td>ASCI 7385</td>
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<tr>
<td>Concepts in Genetic Analysis</td>
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<td>BIOL 5419</td>
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<td>Plant Physiology</td>
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<td>BIOL 5413</td>
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<td>Immunology</td>
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<td>ASCI 7387</td>
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<td>Genomics</td>
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<td>BIOL 5422</td>
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<td>Mammalian</td>
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<td>Physiology</td>
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<td>BIOL 5406</td>
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<td>Pathogenic</td>
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<td>Microbiology</td>
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<td>ASCI 7386</td>
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<td>Recombinant DNA Methods and Applications</td>
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</table>

In this section, any CSAM/EIT course with a regular course number (i.e. Special topics with 5399 or
7399 designation not allowed) may be chosen.
### EMPHASIS AREA: Applied Chemistry

<table>
<thead>
<tr>
<th>CANDIDACY SUBJECTS</th>
<th>Analytical Chemistry</th>
<th>Inorganic Chemistry</th>
<th>Organic Chemistry</th>
<th>Physical Chemistry</th>
<th>Discipline-Specific Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CANDIDACY COURSES</strong></td>
<td>CHEM 7311 Advanced Analytical Chemistry</td>
<td>CHEM 7340 Advanced Inorganic Chemistry</td>
<td>CHEM 7350 Organic Reaction Mechanisms</td>
<td>CHEM 7370 Physical Principles of Chemical Reactivity</td>
<td>In this section, any CSAM/EIT course with a regular course number (i.e. Special topics with 5399 or 7399 designation not allowed) may be chosen.</td>
</tr>
</tbody>
</table>

### EMPHASIS AREA: Applied Computing

<table>
<thead>
<tr>
<th>CANDIDACY SUBJECTS</th>
<th>Hardware</th>
<th>Software</th>
<th>Information</th>
<th>Methods</th>
<th>Discipline-Specific Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CANDIDACY COURSES</strong></td>
<td>SYEN 5399 Advanced Digital Systems</td>
<td>CPSC 7311 Software Engineering</td>
<td>IFSC 7325 Advanced Data Mining Applications</td>
<td>CPSC 5372 Object-Oriented Programming</td>
<td></td>
</tr>
<tr>
<td>CPSC 7321 Operating Systems</td>
<td>CPSC 7321 Operating Systems</td>
<td>IFSC 7330 Information System Security</td>
<td>CPSC 7373 Artificial Intelligence</td>
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<tr>
<td>CPSC 7331 Computer Architecture</td>
<td>CPSC 7341 Telecommunications and Networking</td>
<td>IFSC 7350 Electronic Commerce</td>
<td>CPSC 7375 Machine Learning</td>
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<tr>
<td>IFSC 5339 Network Security</td>
<td>CPSC 7351 Database Design</td>
<td>IFSC 5345 Information Visualization</td>
<td>SYEN 5399 Modeling and Simulation</td>
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<tr>
<td>SYEN 7314 Multi-criteria Decision and Risk Analysis</td>
<td>CPSC 7374 Image Processing</td>
<td>CPSC 7382 Systems Analysis and Design</td>
<td>SYEN 5352 Spatial Time Series</td>
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<tr>
<td>CPSC 7386 Compiler Design</td>
<td>CPSC 5399 Introduction to Computer Security</td>
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</tbody>
</table>
### Emphasis Area: Applied Physics

(Candidacy subjects appear in bold letters below. There may be one or more candidacy courses under each candidacy subject. These appear in regular font.)

<table>
<thead>
<tr>
<th>Candidacy Subjects</th>
<th>Mechanics</th>
<th>Electricity and Magnetism</th>
<th>Quantum Mechanics</th>
<th>Statistical Thermodynamics</th>
<th>Discipline Specific Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CANDIDACY COURSES</strong></td>
<td>ASCI 5315 Advanced Dynamics</td>
<td>PHYS 5321 Electromagnetism</td>
<td>PHYS 5350 Quantum Mechanics I</td>
<td>PHYS 5310 Statistical Thermodynamics</td>
<td>In this section, any CSAM/EIT course with a regular course number (i.e. Special topics with 5399 or 7399 designation not allowed) may be chosen.</td>
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<tr>
<td></td>
<td>ERSC 5373 Hydrogeology</td>
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<tr>
<td><strong>Elastic Wave Theory</strong></td>
<td>ASCI 5355 Elastic Wave Theory</td>
<td>ASCI 5360 Potential Theory</td>
<td>PHYS 5340 Solid State Physics</td>
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</tr>
</tbody>
</table>

### Emphasis Area: Computational Science

(Candidacy subjects appear in bold letters below. There may be one or more candidacy courses under each candidacy subject. These appear in regular font.)

<table>
<thead>
<tr>
<th>Candidacy Subjects</th>
<th>High Performance Computing</th>
<th>Modeling and Visualization</th>
<th>Mathematics</th>
<th>Discipline-Specific Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CANDIDACY COURSES</strong></td>
<td>CPSC 7312 Parallel Processing</td>
<td>CPSC 7383 Modeling and Simulation</td>
<td>MATH 7311 Advanced Linear Algebra</td>
<td>In this section, any CSAM/EIT course with a regular course number (i.e. Special topics with 5399 or 7399 designation not allowed) may be chosen. Course work will be at the discretion of the advisor. Possible disciplines include computational biology, computational chemistry, bioinformatics, numerical analysis, etc.</td>
</tr>
<tr>
<td></td>
<td>CPSC 7321 Operating Systems</td>
<td>MATH 7324 Advanced Numerical Analysis II</td>
<td>MATH 7312 Computational Linear Algebra</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CPSC 7361 Computer Graphics</td>
<td>MATH 7353 Linear and Non-Linear Regression</td>
<td>MATH 7325 Partial Differential Equations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CPSC 7374 Image Processing</td>
<td></td>
<td>MATH 7327 Graph Theory</td>
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<td>MATH 7351 Mathematical Statistics II</td>
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<td>MATH 7354 Experimental Design</td>
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</tbody>
</table>
## Emphasis Area: Engineering Science & Systems

### Candidacy Subjects

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>SYEN 5320 Linear System Theory</td>
<td>ASCI 5315 Advanced Dynamics</td>
<td>ASCI 7302 Electronics I</td>
<td>ASCI 5335 Mechatronics I</td>
</tr>
<tr>
<td>ASCI 5325 Measurement Techniques</td>
<td>ASCI 5320 Introductory Continuum Mechanics</td>
<td>ASCI 5310 Introduction to Signal Processing</td>
<td></td>
</tr>
<tr>
<td><strong>Materials Engineering</strong></td>
<td><strong>Modeling &amp; Simulation</strong></td>
<td><strong>Telecommunication Systems</strong></td>
<td><strong>Discipline Specific Applications</strong></td>
</tr>
<tr>
<td>SYEN 7315 Micro and Nano Fabrication</td>
<td>SYEN 7342 Networks &amp; Combinatorial Optimization</td>
<td>SYEN 5356 Electromagnetic Waves and Antennas</td>
<td>In this section, any CSAM/EIT course with a regular course number (i.e. Special topics with 5399 or 7399 designation not allowed) may be chosen.</td>
</tr>
<tr>
<td>ASCI 7317 Nanostructural Materials</td>
<td>SYEN 5375 Mechanical Vibrations</td>
<td>SYEN 5383 Finite Element Analysis</td>
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</tbody>
</table>

## Emphasis Area: Information Quality

### Candidacy Subjects

<table>
<thead>
<tr>
<th>Information Quality Theory</th>
<th>Information Quality Strategy and Policy</th>
<th>Information Systems Analysis</th>
<th>Database Systems</th>
<th>Discipline Specific Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFQ 7322 Information Quality Theory</td>
<td>INFQ 7367 Information Quality Strategy and Policy</td>
<td>IFSC 7310 Information Systems Analysis</td>
<td>IFSC 7320 Database Systems</td>
<td>In this section, any CSAM/EIT course with a regular course number (i.e. Special topics with 5399 or 7399 designation not allowed) may be chosen.</td>
</tr>
<tr>
<td>INFQ 7322 Information Quality Theory</td>
<td>INFQ 7367 Information Quality Strategy and Policy</td>
<td>IFSC 7310 Information Systems Analysis</td>
<td>IFSC 7320 Database Systems</td>
<td>CPSC 7351 Database Design</td>
</tr>
</tbody>
</table>
Provision to grant a one-time waiver(s) of requirement to take Candidacy subject course(s) at UALR prior to taking Candidacy Exam(s) in those subject(s)

Prior to taking candidacy exams, a Ph.D. student in Applied Science can petition the Graduate Coordinator for a one-time waiver(s) of requirement to take candidacy subject course(s) for credit at UALR if the student has taken comparable course(s) in that(those) subject(s) at the graduate level for credit in another university. The graduate coordinator will approve or deny the petition based on, in part, the following:

1. The student has provided the graduate coordinator with an official syllabus (syllabi) of comparable course(s) (see above paragraph) taken at another university as well as the grade(s) received.

2. Student has met the instructor(s) of the candidacy subject at UALR who has reviewed all materials in Item 1 above, interviewed the petitioner and provided written communication to the Graduate Coordinator (with a copy to the petitioner) as to whether or not he/she is ready to take the exam.

Under no circumstances will a waiver for more than two candidacy subjects be granted nor subsequent requests for waivers be considered.
Graduate Institute of Technology

The mission of the Graduate Institute of Technology (GIT) at the University of Arkansas at Little Rock is to serve as a support unit to DCEIT and CSAM. GIT performs this mission by providing technical and research assistance to both of these colleges as follows:

- Provides high-level professional support specialists including computational, research, and financial experts and other support staff as appropriate.

- Provides support for major instruments and equipment valued at over $2 million; an SGI/Advanced UNIX lab for the computational needs in the science and engineering areas; and machine and electronics shops.

- Coordinates graduate assistantships that are funded from GIT, DCEIT, CSAM, and the Graduate School. Graduate assistants are assigned to the following Departments within DCEIT and CSAM: Applied Science, Chemistry, Computer Science, Information Science, Systems Engineering, Physics and Astronomy, Information Technology, Engineering Technology, and Biology.

- Allocates Post-Doctoral Fellow positions that are two-year appointments with half of the salary funded by GIT and half of the salary funded by research grant.

- Assists with instruction and laboratories needs within both colleges.

- Serves as the umbrella organization for several grant-funded programs at UALR.
Applied Science Office Policies & Procedures  
ETAS 300, (501) 569-8000

**Home Mailing Addresses**  
It is extremely important that we keep up with your current home mailing address at all times. If your address has changed since last semester or if you are a new student, please be sure we have your current address. If your address changes during the semester, you are required to notify the office staff; then you need to notify the Graduate School, Human Resource Services (HRS) and the Registrar's Office. For International students, according to INS policy, a "change of address" form must be filled out each time there is a change of residence. Forms are available in the Applied Science department. This is YOUR responsibility.

**Student Offices**  
Students will be assigned office space during their term of study at UALR. If practical, space will be located near their chosen Doctoral Advisor's research area.

**Keys/Key Cards**  
Key cards (required to obtain any keys) are obtained from http://www.ualr.edu/physicalplant/goforms. Key cards are to have your supervisor’s initials. Key cards are signed by Dr. Haydar Al-Shukri, Chair of Applied Science, and Dr. Keith Hudson, Director of GIT. When the request has been approved take the key cards to Physical Plant to pick up your key(s). Along with your key, your major professor should give you the keypad code to enter their laboratory. Upon graduation, your keys must be turned in to the Physical Plant or you do not receive your degree.

**NOTE: Students are responsible for making sure office/lab doors are locked and lights are turned off.**

**Receipt of Paychecks**  
Graduate Research Assistants, Fellows, and Teaching Assistants get paid twice monthly on the 15th and the last day of the month. Paychecks are distributed by direct deposit to your bank account through the University. You may fill out a direct deposit form at the Payroll Office in the Administration North Building, Room 108. To view your paystub, visit the UALR Web site http://www.ualr.edu and click on the BOSS Online Registration link. Follow the directions posted on that sight to view your paystub. You will need your student ID number and PIN number which can be obtained in the Admissions and Records Office of the UALR when you present a photo ID.

**Photocopying**  
The copy machine is located in the Applied Science Department main office, ETAS 300. Students must acquire a group access code from their major supervisor to use the copier. Copying of copyright material is prohibited.

**Thesis/Dissertation Expenses**  
Students are responsible for all costs pertaining to the preparation and finalization of their thesis/dissertations (that is, copies/transparencies made, binding, special paper, etc.).

**Graduation**  
The Graduation Application should be completed well in advance of your graduation date. To fill out a Graduation Application go to the UALR website and go directly to your BOSS account. The Department of Applied Science now requires that all graduating students fill out a Graduation Check-Out Sheet (exit form). This is for Departmental use only and assists us in making sure you have completed everything in order to leave, as well as, for alumni information purposes.

**Purchase Orders**  
A Departmental Purchase Requisition form is used to order materials and/or supplies, equipment, etc., for your research project. If the purchase is to be paid by grant funds, you need to direct all purchase requisitions to the appropriate personnel in the Graduate Institute of Technology (GIT); otherwise see the Administrative Assistant in the Applied Science Department. You must type or neatly and clearly print pertinent information on this form. You will be responsible for finding vendor(s), acquiring price quotes, getting part or catalog numbers, etc. Please note
that you now need to add sales tax of 7.5%. The account number or project title, your name, the name of your major professor and the date must be included at the bottom of the form.

The completed form is to be returned to the appropriate support person. Check back within 10-15 days if you have not received your order. You will be notified as soon as your order has arrived. Once your order arrives, check the order to ensure that everything was received. Return the packing slip to the appropriate support person to be processed. Please make notes on the packing slip if everything was not received.

**Petty Cash/Cash Reimbursements**

If you must purchase items immediately with your personal money, you MAY be able to be reimbursed for these items. However, there are procedures you must follow. First, approval of the purchase is required from the Principal Investigator (PI) of the project. The PI also will provide you with an appropriate account number for the items. After receiving permission from the PI, talk with the appropriate support person to determine if any of the items are on State Contract. You WILL NOT get reimbursed for any items on State Contract. Next, make your purchase(s) and keep ALL receipts. The original receipts should be returned to the appropriate support person where a form must be completed. There are two forms for reimbursements:

1) A Petty Cash Reimbursement Request Form is used for reimbursements of $25.00 or LESS. The appropriate support person will keep a copy of the completed form and you must take the original form to the Treasure’s Office (Cashier’s) for reimbursement.

2) A Reimbursement Claim Form is used for reimbursements of $25.00 or MORE. The appropriate support person will keep a copy of the completed form and you must take the original form to the Purchasing Department. You WILL NOT get reimbursed at the time you bring this form to Purchasing. They will process the paperwork and a check will be forthcoming within 10 to 14 working days. Once you receive the check, the check stub is to be returned to the appropriate support person to verify the reimbursement.

**Travel**

Provide the appropriate support person with all of your travel information. A travel authorization is completed to make arrangements, including cash advances. Cash advances must be requested 7 days prior to the travel. During your trip, please keep all your receipts. When returning from a trip, you must complete a TR-1 form (available from the department) within 3 days of returning; then return it to the appropriate support person with all of your original receipts. **Please note: you must fill out a travel authorization form before your trip.**

**Mail Boxes**

Mail is delivered to a single location between 12:00 noon and 2:00 pm in ETAS 300 Monday-Friday, excluding holidays. It is the goal of the Department to provide every Applied Science student a mailbox for incoming mail. These student mailboxes are located in the kitchen area of ETAS 300F. If you do not have a mailbox, please contact the Administrative Assistant of Applied Science. You may decline the use of a mailbox if your mail is delivered at another location on campus. Please notify the main office of Applied Science if this is the case for you. Check your mailbox on a regular basis. Packages are delivered throughout the day. When sending packages via UPS, FedEx or DHL, you must fill out a shipping form from Mail Services; either have Mail Services pick up the package or take it to Mail Services yourself. Permission from a faculty member is required before sending any packages.

**Bulletin Boards**

There are two bulletin boards – one outside the main office back door and one in the hallway on the left as you exit the freight elevators (primarily used to list papers/publications submitted by faculty or students). You need to check these bulletin boards periodically because they contain beneficial information.

**Beverages**

Coffee and tea are provided at 15 cents a cup. If you drink coffee and tea, make a mark beside your name on the list located in the kitchen area in ETAS 300. If your name is not there, add it to the list. At the end of the month you will be billed. Please pay the office assistant once you receive a bill.
UALR Graduate School Guide for New Students

Policies

Equal Opportunity / Affirmative Action
The University of Arkansas at Little Rock is committed to the policy of providing equal opportunity for all persons and will not discriminate in admissions, programs, or any other educational function or service on the basis of sex, disability, age, race, national origin, color, or religion. In carrying out this commitment, the University follows the principle of affirmative action and operates with the federal laws and executive orders prohibiting discrimination. Inquiries concerning the application of any of the federal laws or regulations may be referred to the UALR Office of Human Resources, 501-569-3180.

Equal Access Policy
The University of Arkansas at Little Rock makes every effort to meet special accommodation and access needs. For information on specific accommodations for individuals with disabilities, contact the department or organization sponsoring the class or event you wish to attend or call the Office of Disability Support Services at (501) 569-3143. If you have questions, concerns, or comments regarding accommodations and accessibility, you may contact UALR Health Services, (501) 569-3188.

Alternative Formats and Accommodations
This document can be provided in alternative formats. The University of Arkansas at Little Rock makes every effort to meet special accommodation and access needs. For information on specific accommodations for individuals with disabilities, contact the Graduate School or call Disability Support Services at 569-3143.

What You Need to Know and Do Before the First Day of Classes
Visit the UALR Web site for the online schedule of classes: http://www.ualr.edu. All programs require that you be advised before you register for classes.

Registering for Classes
Visit the UALR Web Site at http://www.ualr.edu and click on the BOSS Online Registration link. Follow the directions posted on that sight to register. You will need your student ID number and PIN number which can be obtained in the Admissions and Records Office of the UALR when you present a photo ID.

Car Registration and Parking
There is no extra fee for non-reserved campus parking. However, you need to get a sticker for your car. Stickers are generally made available at a special location on campus (usually in one of the meeting rooms of the Donaghey Center) during the first few weeks of school. They are available the rest of the year at the Parking Office in Public Safety (located in the Plaza Shopping Center on Asher Avenue).

Parking regulations are enforced. In particular, do not leave your car unattended in the circle drive by the Administration South building.

Disability Support Services
UALR accommodates students with documented disabilities of any type. If you think you might be eligible for services, contact Disability Support Services at 569-3143. You could be eligible for extended time on exams, testing in other formats (for example, oral or large print). Assistance with getting books on tape, and other accommodations designed to equalize your opportunity to succeed at UALR. Parking for people with disabilities is available (contact Health Services at 569-3188). There are also rooms in the residence hall equipped for people who use wheelchairs and for people with hearing loss (contact Housing at 661-1743).

For those of you who use books on tape because of visual loss or a learning disability, or who need mobility training on campus because of visual loss, it is critical that you contact Disability Support Services as soon as possible, even if you currently live in another community or state. Most of you who use books on tape know how
long this process can take. Mobility training must be arranged through the State Division of Services for the Blind, and the application process for these services also takes time.

Books
The UALR Bookstore, a branch of Barnes and Noble, is located on the lower floor of the Donaghey Student Center. Both new and used textbooks are sold there for most courses. The Bookstore also carries a wide range of school and office supplies, clothing and munchies. The Campus Bookstore, at 3006 S. University in the Broadmoor Shopping Center, also carries UALR textbooks. Both bookstores buy back textbooks.

Safety
It is best to be prudent: do NOT walk alone on campus after dark. If you do not have a friend to walk with, call the Department of Public Safety (DPS) at 569-3400 from an office or pay phone, or pick up the receiver of one of the campus blue light telephones to be connected with a DPS dispatcher directly. Ask for an escort. Between the hours of 5:30 p.m. to 10:00 p.m. Monday through Thursday, members of the UALR Student Patrol are on duty to perform this service. Later than that, and on weekends, officers will escort you.

If you are interested in becoming a member of the Student Patrol, drop by DPS and fill out an application form. Hours can be arranged around your class schedule.

Remember: if a crime, accident, or other emergency does occur, notify DPS immediately, 569-3400. Contacting the Little Rock Police Department only will delay action to your report since the LRPD’s first action is to call UALR DPS.

Especially for Graduate Assistants

Paperwork
Go to Human Resources Services (Personnel) in the University Services Building and complete the following forms so you can be put on the payroll:

- Federal and State tax forms
- I-9 form. You will need to show two forms of identification such a driver’s license and social security card. Foreign students will need passports and other certificates.
- Drug use statement
- Personal Data Sheet

If you have worked on campus during the previous year, you may not need to complete all of the forms.

International students on F-1 or J-1 visas also must complete the Certificate of On-Campus Employment Eligibility from the International Student Office and return it to the Graduate School. You will not be paid until you have returned the necessary form or forms.

Confirmation Letter
Shortly before school starts, you should receive a letter from the Graduate School delineating the terms of your graduate assistantship. If you have not received your letter by the last two days before the semester starts, please call the Graduate School at 501-569-8661.

Work Assignment
You should meet with your supervisor and arrange your hours shortly before the semester begins. Your hours of work depend on the arrangements you make. Records are not sent to the Graduate School or Payroll office. You are accountable to your supervisor for your time and may be requested to complete a time log for internal departmental use.

Billing
Tuition scholarships will be credited to your account during the registration period. You are responsible for all registration fees. Depending on the arrangements of your assistantship, you may be responsible for part of your tuition. Be sure you have paid your portion or arrange for deferred payment with the Cashier’s Office before the payment deadline. If registration fees are NOT paid by the advertised deadline, a late charge is assessed. Also, be
sure to let the Graduate School know if you make any changes (drop or add) in your schedule. Undergraduate classes, even if required for certification purposes or efficiency removal, will not be covered by the tuition scholarship.

**Paychecks**

You will be paid twice a month, on the 15th and on the last day of each month. If the 15th or last day falls on a weekend, payday will be on the previous Friday. All pay is distributed by direct deposit to your bank account through the University. You may fill out a direct deposit form at the Payroll office in the Administration North Building, Room 108. To view your paystub, visit the UALR Web site [http://www.uarl.edu](http://www.uarl.edu) and click on the BOSS Online Registration link. Follow the directions posted on that sight to view your paystub. You will need your student ID number and PIN number which can be obtained in the Records and Registration Office of the UALR when you present a photo ID.

Those of you whose assistantships are renewed for the next semester should note that there is a six-week gap between the last payday in the fall semester and first payday in the spring.

**Term of Appointment**

Appointments are renewable each semester, contingent upon satisfactory academic progress toward a degree (passing nine graduate hours) and satisfactory work performance. If your initial appointment covered two semesters, you will not receive another notification letter, and you do not need to do anything for your appointment to continue. If your initial appointment was for one semester, ask your supervisor if it will be continued. If not, and if you are interested in finding another appointment, speak to the Graduate School as soon as possible.

**What You Need to Know and Do During the First Week**

**Payment Deadline**

The deadline for payment of all tuition and fees is at the end of the first week of classes and is published in the UALR Schedule of Classes. This is a real deadline! If your total payment has not been received (and you have not made arrangements for a payment plan) you will be administratively withdrawn and will not be able to re-enroll for the semester.

**Schedule Adjustment Period**

The schedule adjustment deadline is also at the end of the first week of classes and is published in the class schedule. During the first week of classes, students may add and drop classes without penalty or notation on the permanent record, and may change from credit to audit status and vice versa. Any increases in tuition costs resulting from schedule changes must be paid by the normal payment deadline.

The end of the schedule adjustment period is not the same as the drop date. As mentioned above, classes dropped during the schedule adjustment period do not show on your record and do not have to be paid for. You may still drop classes after the end of the adjustment period, up to the drop date (about seven weeks into the semester). Your record will show a grade of W and you will get no refund. Incidentally, although you may be forced to drop a class because of circumstances beyond your control, a continued pattern of W grades does not look good on a graduate transcript. As a graduate student, you are expected to be able to judge your time commitments and plan accordingly.

**Withdrawal from the University**

If you must withdraw from the University, or drop all your courses, you may be able to receive a full or partial refund, depending on when you withdraw. Consult the Schedule of Classes for the refund schedule. You can generally get a 100% refund on any or all courses if you drop them by the payment deadline. You can get a 50% refund if you withdraw (drop all classes) within the second week of school. The dates and conditions of this policy may change; be sure to check the Schedule of Classes for the specifics.

**UALR Campus Card**

You will need your campus ID card; for instance, you may want to check a book out of the library or use the exercise equipment at the Donaghey Student Center. Go to the lower level of the Donaghey Student Center near the entrance of the UALR Bookstore. The staff will take your picture and generate your card while you wait. This card will be valid as long as you are a continuing student at UALR; it does not need to be updated. You can also put
money on the card, and use the card to purchase food at the campus cafeterias. In that case, you don’t have to pay sales tax. For definitive information on this facility, please contact Dining Services in the Donaghey Student Center.

Health Services
Cut your finger? Have a sinus infection? Faint from anxiety in your first seminar? Health Services can help. Staff members can treat minor injuries, write some prescriptions, make physician referrals and give you general health information on a wealth of topics. Health Services is located on the lower level of the Donaghey Student Center across from the bookstore.

Postal Services
Need to mail a letter or pay a bill? You can buy stamps from a vending machine in the Donaghey Student Center in the upper level, near Meeting Rooms A, B and C. There is a mailbox in the Student Concourse (nearest to the old Student Union Building, A, which houses computer labs and University Mailing Services). At Mail Services, you may mail a letter there as late as 4:00 p.m. to go out the same day, as long as you provide the postage.

The closest post office to UALR is Asher Station at 7401 Asher Avenue, a bit more than a mile west of the intersection of Asher and University, adjacent to the University of Arkansas Criminal Justice Institute.

Computer/Internet Use
All incoming students are automatically issued e-mail and web site accounts on UALR’s server. The account password is set initially to your student identification number, but you are required to change it to a password of your choice the first time you log on. Access the UALR web mail system at http://mail.ualr.edu
In addition to the computer resources of your program, there are computers available for your use in many locations throughout the campus. These include the Library Lab, the PC Lab, the Mac Lab, the HELP Lab in ETAS 308 and the CyberCafé in the Donaghey Student Center.

Library
You can search the library online through the public access catalog (OPAC) for a book by title, author, subject, a combination of those, or by additional methods. The OPAC will show whether the library holds a book and whether it is currently available in the stacks. You do not even need to go to the library to “go to the library”. Access the Ottenheimer Library online at any time from any place through UALR’s web site at http://www.ualr.edu. Both connections also offer information on your account: you can key in a user number and get a list of materials you have charged out.

In case 300,000 book volumes and 2,600 periodical subscriptions are not enough, the OPAC also offers a gateway to other libraries and databases around the nation. If the book or periodical issue you need is not available in the library, you can usually obtain it through Interlibrary Loan, which offers various book and document delivery services.

Tours of the library are offered by the reference department. These include class and group tours, limited tours for individuals and a self-guided tour using a printed handout. Many other handouts on library holdings and research techniques also are available at the reference desk.

University Writing Center
Do not miss this wonderful resource. Writing is a skill that always can be improved. The staff members of the University Writing Center are qualified and prepared to help writers of all levels. They are trained to help you improve your own writing. They will not do the writing for you and they will not compromise your ownership of your own work.

In addition to personalized assistance, the Center offers other resources: basic English laboratory courses; cassette and computer lessons on usage, punctuation, and structure; a library of books and flyers on writing; and Macintosh computers with software for word processing, publishing, and internet access. The Center is located in Student Union B 116; telephone 569-8343.
Copies

If you have been to the library, you have probably noticed the copy machines in there. Photocopying is subject to copyright laws; it is your responsibility to be aware of them. Then, buy copy cards at the circulation desk; you get a better price per copy than if you pay with handfuls of change. There is also copy machines located outside the entrance to the UALR Bookstore in the Donaghey Student Center.

Donaghey Student Center Fitness and Aquatics

Exercise your body as well as your mind! No matter how busy you are with your studies, it is a sound investment of your time and energy to exercise, and you have already paid for it as part of your student fees. Rather than spending one more hour after countless hours of research or work on a project, take that hour and play racquetball, go for a swim, take an aerobics class, or lift weights. Some of the exercise machines can even be used in a racing mode, so invite your lab partner to come with you.

The Fitness and Aquatic Center is located on the bottom floor of the Donaghey Student Center. Facilities include Arkansas’ only Olympic-sized pool (wheelchair accessible), four basketball courts, seven types of cardiovascular training machines, racquetball and volley ball courts, strength training facilities including free weights and machines and a 1/8 mile, two-lane indoor track with lanes for walking and jogging.

Graduate Student Association (GSA)

The GSA is an organization for graduate students that work with UALR and the Graduate School to assess graduate student needs and help meet those needs. It is not a governing body, but an advocacy group, looking after your interests as a graduate student.

GSA holds monthly meetings that provide information on UALR services, news about special opportunities for UALR graduate students and opportunities to socialize and network with peers. Community leaders often speak at the meetings allowing students to learn more about career options and community issues.

Call the Graduate School (501-569-8781 or 501-569-8661) to find out when and where the meetings are scheduled, and then come!

Graduate Student Research Forum

The Graduate Student Research Forum is a yearly event hosted by the UALR Graduate Student Association. The Forum has the specific goal of giving UALR graduate students a chance to present their scholarly work. Presentations are evaluated by a panel of judges from the University and professional communities. Awards for the finest presentations from each category are presented at a noon luncheon ceremony. Participating in the Research Forum allows students to learn about what other students are doing and get ideas for future projects. Prizewinners have an excellent item to add to their resumé. Check with your program coordinator to find out how participants are chosen in your area. It may be time for you to start a project!

Policy Documents

There are three major documents (besides this one) you should obtain and be familiar with as a UALR graduate student. The Graduate Catalog contains academic policies and specific information about all graduate programs and courses. It is available in the Graduate School to fully admitted students for free, or may be viewed on the World Wide Web at http://www.ualr.edu/gradschool/. The Student Handbook contains the Code of Student Rights, Responsibilities, and Behavior and other nonacademic policies. It is available in the Office of the Dean of Students. Finally, the UALR Dissertation and Thesis Guide contains the guidelines for preparation and submission of dissertations, thesis and other final projects. It appears in its entirety in the Graduate Catalog and can be viewed on the World Wide Web at (http://www.ualr.edu/gradschool/assets/archive/pdfs/thesisguide.pdf).

Grievances and Procedures

As a student, you have specific rights and responsibilities. There are procedures to follow to rectify the situation. The procedures vary depending on the type of problem. Below is a list containing descriptions of situations, the school policy that applies to each situation, where to find the information and the suggested first contact you should make with the administration.
• You believe you have been discriminated against because of your race, ethnicity, sex, disability, or age
• You believe you have been discriminated against because of HIV-positive status
• A student, faculty member, or administrator makes sexual remarks to you that make you uncomfortable
• You are sexually assaulted on campus
• You receive an Allegation of Academic Offense form accusing you of an offense
• You witness another student or students cheating
• You believe someone has tampered with your lab data or broken into your computer account
• You receive a final course grade that you think is unfair
• There is a dispute about what requirements you need to fulfill for your degree
• You believe you should be exempted from or receive special accommodations in a course because of a disability
• You are accused of a behavioral violation
• Another student assaults or verbally abuses you

Grade Point Average
You must maintain a minimum cumulative grade point average of 3.0; it is as simple as that. If you do not, you will be placed on academic probation and will have a fixed amount of time to rectify the situation. Consult “Academic Probation” and “Graduation Requirements” in the Graduate Catalog for more information.
## Support Personnel Contact Information

<table>
<thead>
<tr>
<th>Support Personnel</th>
<th>Telephone</th>
<th>E-mail</th>
<th>Office</th>
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<tbody>
<tr>
<td><strong>Department of Applied Science</strong></td>
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<tr>
<td>Haydar Al-Shukri, Chair</td>
<td>569-8000</td>
<td><a href="mailto:hjalshukri@ualr.edu">hjalshukri@ualr.edu</a></td>
<td>ETAS 300</td>
</tr>
<tr>
<td>Tansel Karabacak, Graduate Coordinator</td>
<td>569-8010</td>
<td><a href="mailto:txkarabacak@ualr.edu">txkarabacak@ualr.edu</a></td>
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<tr>
<td><strong>Department of Biology</strong></td>
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<tr>
<td>John Bush, Chair</td>
<td>569-3270</td>
<td><a href="mailto:jmbush@ualr.edu">jmbush@ualr.edu</a></td>
<td>FH 406</td>
</tr>
<tr>
<td><strong>Department of Chemistry</strong></td>
<td></td>
<td></td>
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<tr>
<td>Jeffrey Gaffney, Chair</td>
<td>569-3152</td>
<td><a href="mailto:jsgaffney@ualr.edu">jsgaffney@ualr.edu</a></td>
<td>SLB 451</td>
</tr>
<tr>
<td>Jeffrey Connelly, Chair</td>
<td>569-3543</td>
<td><a href="mailto:jbconnelly@ualr.edu">jbconnelly@ualr.edu</a></td>
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<tr>
<td><strong>Department of Computer Science</strong></td>
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<tr>
<td>Remzi Seker, Chair</td>
<td>569-8130</td>
<td><a href="mailto:rxseker@ualr.edu">rxseker@ualr.edu</a></td>
<td>EIT 579</td>
</tr>
<tr>
<td><strong>Department of Earth Science</strong></td>
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<tr>
<td>Jeffrey Connelly, Chair</td>
<td>569-3546</td>
<td><a href="mailto:jbconnelly@ualr.edu">jbconnelly@ualr.edu</a></td>
<td>FH 312</td>
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<tr>
<td><strong>Department of Engineering Technology</strong></td>
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<tr>
<td>Mamdouh Bakr, Chair</td>
<td>569-8200</td>
<td><a href="mailto:mmbakr@ualr.edu">mmbakr@ualr.edu</a></td>
<td>ETAS 227</td>
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<tr>
<td><strong>Department of Information Science</strong></td>
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<tr>
<td>Elizabeth Pierce, Chair</td>
<td>569-8951</td>
<td><a href="mailto:expierce@ualr.edu">expierce@ualr.edu</a></td>
<td>EIT 550</td>
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<tr>
<td><strong>Department of Physics and Astronomy</strong></td>
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<tr>
<td>Tony Hall, Chair</td>
<td>569-3275</td>
<td><a href="mailto:tahall@ualr.edu">tahall@ualr.edu</a></td>
<td>PHYS 108</td>
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<tr>
<td><strong>Department of Systems Engineering</strong></td>
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<tr>
<td>Seshadri Mohan, Chair</td>
<td>569-3100</td>
<td><a href="mailto:sxmohan@ualr.edu">sxmohan@ualr.edu</a></td>
<td>EIT 518</td>
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<tr>
<td><strong>Graduate Institute of Technology</strong></td>
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<tr>
<td>Keith Hudson, Director</td>
<td>569-8210</td>
<td><a href="mailto:mkhudson@ualr.edu">mkhudson@ualr.edu</a></td>
<td>ETAS 329</td>
</tr>
<tr>
<td>Missy Hill, Asst to Dir. of GIT</td>
<td>569-8211</td>
<td><a href="mailto:mshill@ualr.edu">mshill@ualr.edu</a></td>
<td></td>
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<tr>
<td>Diane Haynes, Student Services</td>
<td>569-8012</td>
<td><a href="mailto:dkhaynes@ualr.edu">dkhaynes@ualr.edu</a></td>
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<tr>
<td><strong>UALR Graduate School</strong></td>
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<tr>
<td>Patrick Pellicane, Dean</td>
<td>569-8206</td>
<td><a href="mailto:pjpellicane@ualr.edu">pjpellicane@ualr.edu</a></td>
<td>ADN 3rd floor</td>
</tr>
<tr>
<td>Johanna Miller-Lewis, Associate Dean</td>
<td>569-8660</td>
<td><a href="mailto:jmlewis@ualr.edu">jmlewis@ualr.edu</a></td>
<td></td>
</tr>
<tr>
<td>Sheena Brooks, Program Coordinator.</td>
<td>569-8661</td>
<td><a href="mailto:srbrooks@ualr.edu">srbrooks@ualr.edu</a></td>
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<tr>
<td><strong>Emphasis Area Liaisons</strong></td>
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<tr>
<td>John Bush, Applied Biosciences</td>
<td>569-3270</td>
<td><a href="mailto:jmbush@ualr.edu">jmbush@ualr.edu</a></td>
<td>SCLB 383</td>
</tr>
<tr>
<td>Tito Viswanathan, Applied Chemistry</td>
<td>569-8825</td>
<td><a href="mailto:txviswanatha@ualr.edu">txviswanatha@ualr.edu</a></td>
<td>SCLB 469</td>
</tr>
<tr>
<td>Coskun Bayrak, Applied Computing</td>
<td>569-8137</td>
<td><a href="mailto:cxbayrak@ualr.edu">cxbayrak@ualr.edu</a></td>
<td>EIT 577</td>
</tr>
<tr>
<td>Haydar Al-Shukri, Applied Physics</td>
<td>569-8010</td>
<td><a href="mailto:hjalshukri@ualr.edu">hjalshukri@ualr.edu</a></td>
<td>ETAS 101</td>
</tr>
<tr>
<td>Xiu Ye, Computational Science</td>
<td>569-8107</td>
<td><a href="mailto:xxye@ualr.edu">xxye@ualr.edu</a></td>
<td>DKS6 622F</td>
</tr>
<tr>
<td>Abhijit Bhattacharyya, Engineering Science and Systems</td>
<td>569-8027</td>
<td><a href="mailto:axbhattachar@ualr.edu">axbhattachar@ualr.edu</a></td>
<td>EIT 626</td>
</tr>
</tbody>
</table>
Faculty Members and Research Interests

Applied Science Faculty

Al-Shukri, Haydar, Ph.D., St. Louis University (★)
Seismology; applied geophysics; 3-dimensional topography; digital signal processing; infrasonic studies; nuclear monitoring; fault monitoring; earthquake awareness and education.

Anderson, Gary T., Ph.D., University of Texas-Austin (★)
Interaction and cooperative behaviors in groups of mobile robots; biologically inspired architectures for control of mobile robots; learning in autonomous robots; distributed control systems; embedded computing; neural networks for nonlinear dynamic system identification.

Bhattacharyya, Abhijit, Ph.D., Rutgers University, NJ (★, ◆)
Smart Materials (shape memory alloys, ferroelectrics), and MEMS (microelectromechanical systems), thin film heterostructures, and E-Learning in MEMS.

Biris, Alex, Ph.D., University of Arkansas at Little Rock (★)

He, Qingfang, Ph.D., Arizona State University (★, ★)
Protein and biochemistry; genomic and molecular genetic studies of high light stress signal perception and transduction; genetic dissection and metabolic engineering of myxoxanthophyll; biotechnological application of cyanobacteria and microalga.

Hudson, M. Keith, Ph.D., Baylor University (★, ★, ★)
Analytical chemistry and instrumentation; liquid and gas chromatography; atomic and molecular spectroscopy; combustion; simulation of combustion phenomenon; solid and hybrid rockets; propellant and fuel formulation; rocket ground testing; propellant testing.

Karabacak, Tansel, Ph.D., Rensselaer Polytechnic Institute (★)
Nanostructure and thin film growth; properties and applications of 3D nanostructures by oblique angle deposition; dynamics of thin film and nanostructure growth.

Khodakovskaya, Mariya, V., Ph.D., Russian Academy of Sciences (★, ★)
Plant biology, biotechnology, plant genetic engineering.

Wright, Andrew B., Ph.D., Rensselaer Polytechnic Institute (★)
Active sound cancellation; mechatronics and control theory; MEMS; hybrid rocket control; acoustic and vibration measurement; mobile robotics design and control.

Ye, Cang, Ph.D., The University of Hong Kong (★)
Doctoral Faculty

Adams, Al, Ph.D., University of Florida, (✉)
Optics and laser measurement systems.

Agarwal, Nitin, Ph.D., Arizona State University (✉)

Ali, Nawab, Ph.D., Aligarh University, India (★)
Signal transduction and intracellular signaling mechanisms regulating subcellular compartmentation, membrane biogenesis, vesicular transport, endo/exocytosis, protein sorting and targeting, and protein-protein interactions. Emphasis is placed on G-proteins and G-protein coupled receptors, and their second messenger systems such as inositol polyphosphates, cAMP, cGMP, intracellular calcium, protein kinases etc. Biomedical engineering interests are related to development of biocompatible cardiovascular devices.

Al-Rizzo, Hussain, Ph.D., University of New Brunswick, Fredericton, NB, Canada (☎, ➔, ◆)
Electromagnetic/Microwave Communications and the Global Positioning Systems.

Babiceanu, Radu, Ph.D., Virginia Tech University (☎, ➔, ◆)
Modeling, analysis, and evaluation of complex systems; systems architecture and integration; knowledge representation and intelligent systems; agent-based modeling and simulation.

Baltosser, William H., Ph.D., New Mexico State University (★)
Avian ecology; molecular systematics.

Bayrak, Coskun, Ph.D., Southern Methodist University (☎, ➔)
Software engineering; domain oriented high level architecture; component-based software development; intelligent software system design; modeling and simulation; process monitoring and control; intelligent systems.

Berleant, Daniel, Ph.D., University of Texas at Austin (☎, ◆)
Bioinformatics, text mining, inference and prediction under severe uncertainty, technology foresight.

Berry, Brian, Ph.D., University of Arkansas at Little Rock (✉)
Polymer Chemistry, self-assembly of nanostructures, and organic photovoltaics.

Bouaynaya, Nidhal, Ph.D., University of Illinois at Chicago (◆)
Genomic sequences, Spatially-variant mathematical morphology, motion-based particle filtering for head tracking applications, protein communication systems.

Bush, John M., Ph.D., Louisiana State University At Shreveport Medical Center (★)
Analysis of Vesicular Transport in Eukaryotic Cells; Bioinformatics and Molecular Analysis of Avian Systematics

Chan, Yupo, Ph.D., Massachusetts Institute of Technology (☎, ➔, ◆)
Telecommunications; transportation; spatial-temporal information; operations research; optimization; stochastic networks; spatial statistics; facility-location; land-use modeling, and signal processing.

Chen, Tar-pin, Ph.D., University of New York at Buffalo (✉)
Thin film fabrication (magnetron and laser ablation), nanomaterials and nanodevices (including superconductor, terahertz, qubits, solar cells, semiconductor and metal oxides), phase transition and critical phenomena, correlated/coherence phenomena.

Chiang, Chia-Chu, Ph.D., Arizona State University (☎)
Software engineering; reengineering; program analysis; component-based software development.

Cui, Jingbiao, Ph.D., University of Science and Technology, of China (✉)

53
Semiconductor physics and nanomaterials; growth and physical properties of semiconducting nanostructures and thin films; electronic and optoelectronic devices.

**Dagtas, Serhan**

**Darsey, Jerome A., Ph.D., Louisiana State University (▲)**
Physical chemistry and computational chemistry; theoretical calculations to determine molecular structures of electroactive polymers and biopolymers; applications of artificial intelligence to chemical systems; nanotechnology. Position emission topography (PET) studies with colleagues at University of Arkansas for Medical Sciences.

**Elsalloukh, Hassan, Ph.D., Baylor University (■)**
Distributional theory; multivariate analysis; bayes inference, and linear models.

**Gaffney, Jeffrey S., Ph.D. University of California, Riverside (Chemistry) (▲)**
Atmospheric and environmental chemistry, climate change, aerosols, organic oxidants (peroxyacyl nitrates), stable isotopes and natural radionuclides as tracers, analytical instrumentation development, chemiluminescent reactions, humic and fulvic acids, surface and groundwater chemistry, global change and environmental science education.

**Gealt, Michael, Ph.D., Rutgers University (★)**

**Ghosh, Anindya, Ph.D., Carnegie Mellon University (▲)**
Catalysis, small molecule activation, asymmetric synthesis, polymer synthesis, sensor and storage devices, anticancer drug synthesis, chemistry related to oil-field.

**Grace, Stephen, Ph.D., Duke University (★)**
Biochemistry of active oxygens and antioxidants; plant bioenergetics; oxidant signaling mechanisms; physiological ecology of secondary plant metabolites.

**Hall, Tony A., Ph.D., Purdue University (◆)**
Gamma-rays; x-rays; pulsars; supernova remnants; high mass x-ray binaries; eclipsing binaries; Cherenkov radiation astronomy.

**Huang, Guoliang, Ph.D., University of Alberta, Canada (◆)**
Multi-scale continuum modeling, Nanomechanics, phononic and nano-phononic structures, wave propagation, structural health monitoring, smart materials and structures, damaga and fracture mechanics, dynamic behavior of advanced structures.

**Iqbal, Kamran, Ph.D., Ohio State University (♣, ▲, ◆)**
Biomechanics and control of human movement; robotics and human-robot interaction; system modeling and simulation; computer-controlled systems; industrial process control; automatic flight/vehicle control; INS and GPS navigational guidance.

**Jennings, Steven, F., Ph.D., Iowa State University (★, ♦, ♦, ♦)**
Bioinformatics and computational biology; modeling, simulation and visualization of biological systems; distributed and parallel systems; technical infrastructure, software systems architecture, and software engineering practices.

**Kaufmann, Eric R., Ph.D., Auburn University (□)**
Boundary value problems; Green’s functions for ordinary differential and difference equations; finite difference equations; integral transforms; measure chains.

**Kim, Jung, Ph.D., University of Iowa (♣, ▲, ◆)**
Bioinformatics; promoter sequence analysis, dynamic programming, genetic algorithms; artificial neural networks.

**Kleve, Maurice, Ph.D., University of Houston (★)**

**Kosmatov, Nickolai, Ph.D., Auburn University. (□)**
Ordinary Differential Equations.

Lai, Lifeng Ph.D., Ohio State University (Φ)

Lanza, Janet, Ph.D., University of Connecticut (★)

Liu, Xian, Ph.D., University of British Columbia (Φ)
Communication networks; applied optimization; kernel of operating systems; spatial ordering.

Mahdi, Hanan, Ph.D., St. Louis University (Φ)
Paleoseismology; seismology; shallow geophysics; potential fields analysis.

Marley, Nancy, Ph.D., Florida State University (▲)
Analytical Chemistry, atmospheric chemistry, aerosols

McMillan, Beth, Ph.D., University of Wyoming (✦)

McMillan, Thomas, Ph.D., University of Utah (■)

Midturi, Swaminadham, Ph.D., Indian Institute of Technology, Kharagpur, India (Φ)
Stress and vibration analysis of aircraft components and aerospace structures, MEMS for aerospace applications, mechanical properties characterization of nano/micro thin films.

Milanova, Mariofanna, Ph.D., Technical University Bulgaria (❉, ■)
Computer graphics; digital image processing and computer vision; AI; neural networks; bioengineering; data mining; computational biology.

Mohan, Seshadri, Ph.D., McMaster University, Ontario, Canada (Φ)
Voice, data, and multimedia over packets and wireless, including 3G; next generation networking and VoIP; Personal Communications Services (PCS); protocols for optical communications over IP; and applications of nanotechnology to telecommunications.

Pierce, Elizabeth, Ph.D., The University of Michigan, Ann Arbor, MI. (❉, ■)
Information Quality including data governance, information system analysis and design, data mining, simulation, and quantitative analysis.

Pidugu, Srikanth, Ph.D., Old Dominion University (■, ◆)
Combustion; computational fluid dynamics (CFD); emissions; smart fluids.

Powell, Lawrence, Ph.D., University of Georgia.
Economics of insurance; insurance regulation; insurance fraud; internal capital markets; insurance marketing technology.

Ramaswamy, Srini, Ph.D., University of Southwestern Louisiana (❉)
Intelligent and flexible control systems; behavior modeling, analysis and simulation; software stability and scalability.

Seigar, Marcus, Ph.D., Liverpool John Moores University (✦)
Extragalactic Astronomy; galaxy structure; galaxy dynamics; galaxy formation and evolution; supermassive black holes; dark matter; star formation in galaxies.

Seker, Remzi, Ph.D., University of Alabama at Birmingham (❉)
Computer Security, Disaster and Infrastructure Engineering, Software Engineering.

Seo, Hye-Won, Ph.D., University of Houston (✦)
Superconducting oxide thin films; Strain effect and strain-induced defect of materials; Nitride semiconducting films and nanostructures; Novel optoelectronic device fabrications; Field emission device fabrications; Solar cell device fabrications; Photovoltaic measurement.

Shaikh, Ali, Ph.D., Howard University (▲)
Analytical Chemistry, metal-based derived sulfonamides, lignosulfonic acid-doped polyaniline, polymer chemistry

Sikes, Robert, Ph.D., University of Minnesota (★)
Behavioral and evolutionary ecology.

Talburt, John, Ph.D., University of Arkansas, Fayetteville (▲, ★, ▶)
Webpage: [http://technolgize.ualr.edu/eriq/](http://technolgize.ualr.edu/eriq/)
Information quality; entity resolution and entity identification; data integration; knowledge representation; semantic interoperability.

Tang, Fusheng, Ph.D., The University of Iowa (★)
Tarasenko, Olga, M.D., Ph.D., Kyrgyz State Medical Academy, Kyrgyzstan (★)
Postdoctoral, Polytechnic University, Brooklyn, New York
URL: [www.geocities.com/tarasenko_info/welcome.html](http://www.geocities.com/tarasenko_info/welcome.html)
Recognition, cell-cell and cell-receptor interaction, binding, phagocytosis, computational biology of recognition, and signal transduction, human immunogenetics associated with susceptibility to infectious diseases

Tudoreanu, Mihail, Ph.D., Washington University in St. Louis (▲, ★, ▶)
Information visualization; virtual reality; human-computer interaction; algorithm visualization.

Viswanathan, Tito, Ph.D., Tulane University (▲)
Organic and green (environmentally friendly) polymer chemistry; synthesis and characterization of polymers from renewable sources, conducting polymers and composites.

Wang, Hong Li, Ph.D., University of Newcastle, Australia (★)
Plant molecular biology.

Wang, Xiaoshen, Ph.D., Michigan State University (★)
Numerical analysis with concentration on solving polynomial systems.

Wigand, Rolf T., PhD., Michigan State University (▲, ★, ▶)
Electronic commerce and markets; organizational impact of information and communication technologies (ICT); standards development; industry-level ICT impact research; policy and ICT; strategic use of ICT.

Wu, Ningning, Ph.D., George Mason University (▲, ★, ▶)
Data mining; database and internet security; cryptography.

Xi, Jinxiang, Ph.D.

Xu, Xiaowei, Ph.D., University of Munich (▲, ★, ▶, ▪)
Data mining; knowledge discovery in databases; bioinformatics; high performance computing; biomedical and commercial applications of data mining and database technologies.

Yanoviak, Stephen, Ph.D., University of California, Berkeley (★)
Insect ecologist, Arthropod, Entomology

Yao, Vincent W., Ph.D., University of Albany-SUNY.
Transportation economics.
Ye, Xiu, Ph.D., University of Pittsburgh, PA (■)
Numerical analysis.

Yoshigoe, Kenji, Ph.D., University of South Florida (☉)
Operating Systems; networking.

Zeng, Lirong, Ph.D., Ohio State University (★)

Zhang, Jing, Ph.D., Swiss Federal Institute of Technology (ETH), Zurich, Switzerland (●)
Integrated signal processing; power control and communication in micro electromechanical sensors, actuators and systems; industrial design of the conventional and special motion control systems with micro- and nano-scale precision.

Zhao, Wei, Ph.D., Peking University (▲)
Analytical and physical chemistry; materials science; application of nonlinear laser spectroscopy multi-resonant four wave mixing for structure and interaction studies on complex systems; two-dimensional infrared correlation spectroscopy.

Emeritus Faculty

Hawk, Roger M., Ph.D., University of Michigan (★, ▲, ♦)
Physical, analytical and inorganic chemistry; liquid and solid state nuclear magnetic resonance; magnetic resonance imaging; semiconductors and solar cells.

Mazumder, Malay K., Ph.D., University of Arkansas-Fayetteville (●)
Laser Doppler velocimetry; turbulence characterization; aerosol technology; acoustics; optical character recognition; biomedical instrumentation; telemetry; instrumentation development.
Selection of Major Advisor

Department of Applied Science

Date: ________________

To: Dr. Haydar Al-Shukri

From: ________________________

Re: Proposed Research Advisory

____________________________ Has agreed to serve as my Major Advisor.
(Print or type)

____________________________
(Signature of Research Advisor)

Approved: _____________________ Date: ________________

Description of financial commitment from the Major Advisor to the student

________________________________________________________________________
________________________________________________________________________
ANNUAL GRADUATE STUDENT PROGRESS REPORT
DEPARTMENT OF APPLIED SCIENCE
(write N/A in those fields that do not apply to you)

(Must be completed by May 15 – Return to the Department of Applied Science Office)

Student information

Name of student: _________________________ Reporting Period: May 16, 20___ to May 15, 20__
M.S. □
Ph.D. □ Emphasis area:
Date entered program: ____________ Expected completion date: ____________

Academic Progress (see Appendix A)

Semester Laboratory Rotation Completed: ___________________________
Dissertation Title: _____________________________________________
Dissertation Advisor: _____________________________________________
TOTAL CREDITS COMPLETED INCL. CURRENT SEMESTER: ________
(Do not include lab rotation and seminar credits)

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Semester &amp; Year Completed</th>
<th>Total credits completed incl, the semester of completion (do not include rotation and seminar credits)</th>
<th>Program Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>M.S.</td>
<td>Ph.D.</td>
</tr>
<tr>
<td>Major Advisor selection</td>
<td></td>
<td>9 credits</td>
<td>18 credits</td>
</tr>
<tr>
<td>Dissertation Committee formation</td>
<td></td>
<td>9-18 credits</td>
<td>27 credits</td>
</tr>
<tr>
<td>Take Candidacy Exams</td>
<td></td>
<td>N/A</td>
<td>45 credits</td>
</tr>
<tr>
<td>Defend Proposal</td>
<td></td>
<td>18 credits</td>
<td>63 credits</td>
</tr>
<tr>
<td>Defend Thesis</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Dissemination of your research

<table>
<thead>
<tr>
<th>ITEM</th>
<th>THIS REPORTING PERIOD</th>
<th>SINCE JOINING PROGRAM</th>
<th>NUMBER PLANNED FOR NEXT REPORTING PERIOD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conferences where you participated or will participate as an author</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conference proceedings</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Journal papers submitted</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Journal papers accepted/published</td>
<td></td>
<td></td>
<td>N/A</td>
</tr>
</tbody>
</table>

**** In Appendix B, give details of all items listed in above table for this reporting period****

Self-Assessment

Based on the guidelines in Appendix A and your report in the previous section on "Academic Progress", are you on track for timely completion of your degree? If not, explain the reasons for the delay and how do you propose to speed up your academic progress (please limit your response within the provided space)?

ASSESSMENT BY THE DISSERTATION ADVISOR:

The Dissertation advisor's comments on the student's self-assessment are given below.

☐ Student is making satisfactory progress toward his/her degree
☐ Student is making unsatisfactory progress toward his/her degree

Advisor: Date:

Student: Date: _
APPENDIX A: Academic Progress

A student’s academic performance will be considered unacceptable if he/she fails to complete the following requirements in the semester that the student has accumulated program credits as mentioned below.

M.S. Students

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Accumulated program credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major advisor selection</td>
<td>9 credits</td>
</tr>
<tr>
<td>Advisory committee formation &amp; proposal defense</td>
<td>18 credits</td>
</tr>
</tbody>
</table>

Ph. D. Students

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Accumulated program credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major advisor selection</td>
<td>18 credits</td>
</tr>
<tr>
<td>Dissertation Committee formation</td>
<td>27 credits</td>
</tr>
<tr>
<td>Take Candidacy exams</td>
<td>45 credits</td>
</tr>
<tr>
<td>Defend proposal</td>
<td>63 credits</td>
</tr>
<tr>
<td>Defend thesis</td>
<td>Within 2 years of proposal defense</td>
</tr>
</tbody>
</table>

APPENDIX B: Dissemination of research during the reporting period

(give details below; use additional pages if needed)

1. Conferences where you participated or will participate as an author

2. Conference Proceedings

3. Journal papers submitted

4. Journal papers accepted/published
APPOINTMENT OF SUPERVISING OR EXAMINING COMMITTEE

☐ Check here if this form amends and supersedes one submitted earlier.

To: Dean of the Graduate School

RE: ________________________________________________________________

Student name and ID number

____________________________________________________________________

Street Address, city, state, zip

Major/option code: __________________________________________________

Type of Committee:

☐ Comprehensive Examination ☐ Doctoral Dissertation ☐ Doctoral Program
☐ Master’s Thesis ☐ Portfolio ☐ Project/Other _____________

____________________________________________________________________

Proposed title of thesis/dissertation/portfolio ___________________________

Anticipated Completion Date __________________________

Faculty members recommended for the above-named student and committee:

(give name and title: e.g. Dr. John Doe, associate professor of biology)

(Chair) ____________________________________________________________

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

Graduate Coordinator __________________________ Date

____________________________________________________________________

Graduate Dean __________________________ Date

Copies: Student, Advisor, Graduate Program Coordinator, Registrar, Graduate Dean

January 2008
SUPervisory or Examining Committee

☐ Check here if this form amends and supersedes one submitted earlier.

To: Dean of the Graduate School

Re: ____________________________

Student Name ____________________________

ID Number ____________________________

Address ____________________________

Graduate Program: ____________________________ Examination Date ______________

The above-named student has attempted the:

☐ Comprehensive Examination ☐ Oral Proposal* ☐ Thesis/Project Defense

☐ Dissertation Defense ☐ Portfolio Defense ☐ Other ____________________________

* When applicable, attach a Human Subjects review form

This is to certify that the student’s overall performance was rated as:

☐ Satisfactory ☐ Unsatisfactory

Comments: __________________________________________________________

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

Signatures of Committee:

_____________________________ The committee chair notified the student in
Chair writing of the results of this examination.

_____________________________ Departmental Coordinator (if applicable) Date __________

_____________________________ Graduate Program Coordinator Date __________

_____________________________ Graduate Dean Date __________

☐ The student named above has completed all course requirements for the dissertation, thesis, or project and all
thesis, dissertation, or project hours currently listed as IP should be changed to a grade of _____ (usually CR/NC).

The minimum number of hours for this program is ________________.

The catalog year under which the student entered is ________________.

Forwarded to registrar only if performance was satisfactory

Copies: Student, Advisor, Graduate Program Coordinator, Registrar, Graduate Dean

January 2008
# CANDIDACY EXAM REQUEST

This form needs to be routed through your dissertation advisor and submitted to the Graduate Coordinator for approval.

**Your name:**

**Semester in which you joined the program:**

**Your Emphasis area:**

**Name of your dissertation advisor:**

**No. of credits you have taken so far:**

1. Include current semester,
2. Do not count rotation credits
   and colloquium credits)

**Semester and Year requesting exam:**

<table>
<thead>
<tr>
<th>Candidacy subject</th>
<th>Candidacy Course Name</th>
<th>Candidacy Course Number</th>
<th>Name of instructor with whom you have taken this course, the semester in UALR you took the course and the grade you received</th>
</tr>
</thead>
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</tbody>
</table>

Signature of student and date

APPROVALS:

Signature of Dissertation Advisor and Date

Signature of Graduate Coordinator and Date

****MAKE A COPY FOR YOURSELF AND SUBMIT THE ORIGINAL FORM TO MS. DANA BALL AT THE APPLIED SCIENCE OFFICE****