PhD in Informatics with Emphasis in Bioinformatics

Degree Requirements

The following is a brief synopsis of the general degree requirements; please see the Informatics Institute web site (https://mui.missouri.edu) for complete details:

- Students must take required and area courses.
- Students must pass a qualifying examination.
- Students must present at least one institutional seminar annually.
- Students are required to complete a comprehensive exam, which includes written and oral elements, within a specified time frame.
- Students must pass a comprehensive examination at least 7 months before their scheduled defense.
- Students must submit and defend a dissertation describing the results of successful and original research in one of the branches of informatics.
- To show research progress, students are expected to be working toward presenting at conferences and publishing in peer-reviewed journals based on their informatics research.

Coursework Requirements

All students must have at least 72 credit hours at the graduate level, of which 15 credits must be at the 8000-level not including research, problems, lab rotations, or seminar. Transferring credits will be at the recommendation of the student's doctoral committee and the approval of the MUII Curriculum Committee.

REQUIRED CORE COURSES - BIOINFORMATICS EMPHASIS

<table>
<thead>
<tr>
<th>Area</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFOINST</td>
<td>7002</td>
<td>Introduction to Informatics</td>
<td>3</td>
</tr>
<tr>
<td>INFOINST</td>
<td>7010</td>
<td>Computational Methods in Bioinformatics</td>
<td>3</td>
</tr>
<tr>
<td>INFOINST</td>
<td>8810</td>
<td>Research Methods in Informatics</td>
<td>3</td>
</tr>
<tr>
<td>STAT</td>
<td>7510</td>
<td>Applied Statistical Models I</td>
<td>3</td>
</tr>
</tbody>
</table>

Student must choose one additional 3-credit methods course with doctoral committee approval.

LAB ROTATIONS AND SEMINAR

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFOINST</td>
<td>8087</td>
<td>Seminar in Informatics (Must be enrolled each semester)</td>
</tr>
<tr>
<td>INFOINST</td>
<td>8088</td>
<td>Lab Rotations in Informatics</td>
</tr>
</tbody>
</table>

RESEARCH

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFOINST</td>
<td>8090</td>
<td>Dissertation (pre-candidacy) Research in Informatics</td>
</tr>
<tr>
<td>INFOINST</td>
<td>9090</td>
<td>Dissertation (post-candidacy) Research in Informatics</td>
</tr>
</tbody>
</table>

AREA COURSE ELECTIVES (15 credits)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AN_SCI</td>
<td>7001</td>
<td>Topics in Animal Science (Molecular Evolution)</td>
</tr>
<tr>
<td>CMP_SC</td>
<td>7380</td>
<td>Database Management Systems I</td>
</tr>
<tr>
<td>CMP_SC</td>
<td>7740</td>
<td>Interdisciplinary Introduction to Natural Language Processing</td>
</tr>
<tr>
<td>CMP_SC</td>
<td>8370</td>
<td>Data Mining and Knowledge Discovery</td>
</tr>
<tr>
<td>CMP_SC</td>
<td>8630</td>
<td>Data Visualization</td>
</tr>
<tr>
<td>ECE 7270</td>
<td>Computer Organization</td>
<td>4</td>
</tr>
<tr>
<td>ECE 7590</td>
<td>Computational Neuroscience</td>
<td>4</td>
</tr>
<tr>
<td>ECE 8320</td>
<td>Nonlinear Systems</td>
<td>3</td>
</tr>
<tr>
<td>ECE 8570</td>
<td>Theoretical Neuroscience I</td>
<td>3</td>
</tr>
<tr>
<td>ECE 8580</td>
<td>Theoretical Neuroscience II</td>
<td>3</td>
</tr>
<tr>
<td>GEOG 7620</td>
<td>Biogeography: Global Patterns of Life</td>
<td>3</td>
</tr>
<tr>
<td>GEOG 7710</td>
<td>Spatial Analysis in Geography</td>
<td>3</td>
</tr>
<tr>
<td>GEOG 7810</td>
<td>Landscape Ecology and GIS Analysis I</td>
<td>3</td>
</tr>
<tr>
<td>GEOG 7840</td>
<td>Geographic Information Systems I</td>
<td>3</td>
</tr>
<tr>
<td>GEOG 7860</td>
<td>Advanced Remote Sensing</td>
<td>3</td>
</tr>
<tr>
<td>GEOG 7940</td>
<td>Advanced Geographic Information Systems (GIS II)</td>
<td>3</td>
</tr>
<tr>
<td>GEOG 8902</td>
<td>Topics in Geography-Biological/Physical/Mathematical</td>
<td>1-3</td>
</tr>
<tr>
<td>HMI 7410</td>
<td>Introduction to the US Health Care System</td>
<td>3</td>
</tr>
<tr>
<td>HMI 8435</td>
<td>Information Security, Evaluation and Policy</td>
<td>3</td>
</tr>
<tr>
<td>HMI 8437</td>
<td>Data Warehousing and Data/Text Mining for Health Care</td>
<td>3</td>
</tr>
<tr>
<td>HMI 8441</td>
<td>Biomedical and Health Vocabularies and Ontologies</td>
<td>3</td>
</tr>
<tr>
<td>HMI 8443</td>
<td>Enterprise Information and Solutions Architecture for Strategic Healthcare Operations</td>
<td>3</td>
</tr>
<tr>
<td>HMI 8460</td>
<td>Administration of Health Care Organizations</td>
<td>3</td>
</tr>
<tr>
<td>HMI 8461</td>
<td>Managing Human Resources in Health Care Organizations</td>
<td>3</td>
</tr>
<tr>
<td>HMI 8478</td>
<td>Knowledge Management in Health Care</td>
<td>3</td>
</tr>
<tr>
<td>HMI 8524</td>
<td>Health Economics</td>
<td>3</td>
</tr>
<tr>
<td>HMI 8565</td>
<td>Health Care Ethics</td>
<td>3</td>
</tr>
<tr>
<td>HMI 8571</td>
<td>Decision Support in Health Care Systems</td>
<td>3</td>
</tr>
<tr>
<td>HMI 8573</td>
<td>Decision Making for Health Care Organizations</td>
<td>3</td>
</tr>
<tr>
<td>HMI 8610</td>
<td>Consumer Health Informatics</td>
<td>3</td>
</tr>
<tr>
<td>IMSE 8810</td>
<td>Human Factors</td>
<td>3</td>
</tr>
<tr>
<td>INFOINST</td>
<td>8005</td>
<td>Applications of Bioinformatics Tools in Biological Research</td>
</tr>
<tr>
<td>INFOINST</td>
<td>8085</td>
<td>Problems in Informatics</td>
</tr>
<tr>
<td>INFOINST</td>
<td>8150</td>
<td>Integrative Methods in Bioinformatics</td>
</tr>
<tr>
<td>INFOINST</td>
<td>8190</td>
<td>Computational Systems Biology</td>
</tr>
<tr>
<td>INFOINST</td>
<td>8310</td>
<td>Computational Genomics</td>
</tr>
<tr>
<td>INFOINST</td>
<td>8870</td>
<td>Knowledge Representation in Biology and Medicine</td>
</tr>
<tr>
<td>IS_LT</td>
<td>9410</td>
<td>Seminar in Information Science and Learning Technology</td>
</tr>
<tr>
<td>NURSE</td>
<td>9460</td>
<td>Theories and Interventions in Health Behavior Science</td>
</tr>
<tr>
<td>PTH_AS</td>
<td>7450</td>
<td>Precision Medicine Informatics</td>
</tr>
</tbody>
</table>

Qualifying Exam Process

Students are expected to take the qualifying exam by the end of their third semester in the program. The exam will be based on their previous coursework, lab rotation experience, and one-page research statement. For more information on qualifying exam procedures, please see the
Comprehensive Exam Process

The comprehensive exam consists of two parts - the written portion, comprised of an R01 research proposal, and the oral exam. For more information on the comprehensive exam process, please see the MUII student handbook (https://muii-wh-prod.missouri.edu/wp-content/uploads/2017/05/MUII_Graduate_Student_Handbook_Fall2016.pdf).

Dissertation Defense Process

The doctoral dissertation defense must be scheduled no sooner than seven months after successful completion of the comprehensive exam. The dissertation must be written on an informatics subject approved by the candidate's doctoral program committee, must embody the results of original and significant investigation, and must be the candidate's own work. Please refer to the MUII student handbook (https://muii-wh-prod.missouri.edu/wp-content/uploads/2017/05/MUII_Graduate_Student_Handbook_Fall2016.pdf) for additional information.

Admission Contact Information

MUII Staff (mailto: muiiadmissions@missouri.edu)
241 Engineering Building West
Columbia, MO 65211-2060
Phone: 573-882-9007
FAX: 573-884-8709
Informatics Institute (MUII) website: https://muii.missouri.edu

Admission Criteria

Fall deadline: The deadline for Fall admission is March 1. However, to be considered for departmental and Graduate School fellowships and assistantships, applications should be submitted by January 15.

- Preferred GPA: 3.3 out of 4.0
- Preferred GRE scores:

<table>
<thead>
<tr>
<th>When did you take the GRE?</th>
<th>Verbal + Quantitative</th>
<th>Analytical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prior to August 1, 2011</td>
<td>1200</td>
<td>3.5-4.0</td>
</tr>
<tr>
<td>On or After August 1, 2011</td>
<td>309</td>
<td>3.5-4</td>
</tr>
</tbody>
</table>

* or a preferred GMAT score of 570
* Preferred TOEFL or IELTS scores**:

<table>
<thead>
<tr>
<th>Internet-based test (iBT)</th>
<th>Paper-based test (PBT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>90</td>
<td>577</td>
</tr>
</tbody>
</table>

All Required Documents

Students are required to send ALL required application materials through the Office of Graduate Studies on-line application system. To begin your application, please see the ApplyYourself website (http://gradschool.missouri.edu/admissions/apply).

1. Curriculum Vitae
2. Statement of Purpose, which should include a summary of why the applicant is interested in pursuing an advanced informatics degree, a brief description of your previous research experiences, the specific area of informatics you are interested in pursuing, and your future career goals and plans in the informatics field.
3. GRE/GMAT scores. Use institution code 6875. The departmental code is not required.
4. TOEFL/IELTS scores for international applicants, if required.
5. Three letters of recommendation from faculty or supervisors who can evaluate the applicant's credentials and potential to become successful in the area of informatics.
6. Scanned copies of transcripts from each college and university attended. If accepted, applicants will be required to have official copies of their transcripts sent directly from the institution to the Office of Graduate Studies.

Optional Documents

Applicants are encouraged to submit representative publications in informatics, if available.

Exceptional Funding Opportunities - Biomedical Big Data Science Pre-doctoral Training

Funded by NIH T32 (2016-2021)

MU Informatics Institute (MUII) is recruiting SIX top-notch trainees to pursue PhD degree in Informatics through an interdisciplinary training team. Students from basic sciences, life sciences, medicine, and computing disciplines are welcome to apply. Our unique training includes: (1) personalized training modules from core courses of the MS degree in Data Science and Analytics program, Big Data courses from Computer Science, and biomedical informatics courses from MUII, which will expose trainees to the basic concepts, ethics, and working knowledge in Big Data Science; (2) a problem-based learning curriculum in pre-doctoral-level Big Data-related courses, such as Mining Massive Data Sets for Biomedical Applications, designed to foster a team science approach to problem-solving; (3) a student-driven journal club/seminar series, in which students are offered opportunities to present research, pose questions, and receive feedback from peers and mentors. Our interdisciplinary components include (1) required tri-lab rotations to introduce students to animal/veterinary medical research, human medical research, computing/statistical methodologies, and health communications; (2) development of rigorous and reproducible open-source Big Data analytics tools, which will be assessed by the One Health research community after arduous testing; and (3) creation of an Individual Development Plan based on each trainee's background and career goal prior to joining the program. These positions are open to permanent residents and US citizens only. Women and minority students are encouraged to apply.

Please contact the project director Dr. Chi-Ren Shyu at ShyuC@missouri.edu (shyc@missouri.edu) for inquiries.