

## Master of Science in Applied and Computational Mathematics and Statistics

**Effective:** Dec, 2022

**Introduction** The Master of Science in Applied and Computational Mathematics and Statistics (Research) (MS-ACMS) is intended to recognize masters-level competency in applied and computational mathematics and statistics for students enrolled in a doctoral program at the University. Students in ACMS will satisfy the requirements of the master degree en route to their doctorates, and students in other doctoral programs at the University may obtain the degree by taking ACMS courses and passing the written examination and project requirement described below. This is a different degree from the professional Master of Science in Applied and Computational Mathematics and Statistics, which is intended to be a terminal degree.

### Master's degree requirements

#### Course and credit requirements

- 30 credits are required
- 21 credits of graduate-level coursework in ACMS are required. At most 3 of these credits can be earned using Directed Readings, Directed Master's Project or Research & Dissertation credits. If 21 ACMS credits are to include both ACMS 60849 Intermediate Probability and ACMS 60850 Applied probability, ACMS 60849 should be taken before ACMS 60850.
- Up to 9 credits of graduate-level coursework in a department besides ACMS may be counted towards the degree. These courses must have a quantitative content and be approved by the ACMS Director of Masters Programs (DGS) for credit towards the MS-ACMS degree.
- For a doctoral student outside of ACMS, up to 9 credits of the required 30 credits may also be counted towards the requirements of a doctoral degree in the student's doctoral department. No credits may be counted towards a doctorate and two masters degrees.
- A doctoral student in ACMS should be advised that he or she is responsible for satisfying all additional course and credit requirements that apply to students in the doctoral program.

**Written examination** Each student must demonstrate a working knowledge of material covered in two basic ACMS courses. One such requirement can be satisfied by earning at least a B+ in Intermediate Probability. Other possible courses are: ACMS 60850 Applied Probability, ACMS 60690 & 60790 Numerical Analysis I and II, ACMS 60650 Applied Partial Differential Equations, ACMS 60786 Applied Linear Models, or ACMS 60801 Statistical Inference. The student may show a working knowledge of the material in one of these courses by (1) earning at least a B+ in the course, or (2) passing the Department's Written Candidacy Exam in the course

material. The Department's Written Candidacy Exams are described in [ACMS Graduate Guide](https://www3.nd.edu/~acms/Graduate_Documents/Guide/4_15_2019.pdf) (in spring 2019: [https://www3.nd.edu/~acms/Graduate\\_Documents/Guide/4\\_15\\_2019.pdf](https://www3.nd.edu/~acms/Graduate_Documents/Guide/4_15_2019.pdf)). If one requirement is met with Intermediate Probability, the second requirement cannot be in Applied Probability.

**Project requirement.** Every student must pass a research requirement. This may be done by passing the course ACMS 80695 Research Masters Project, or passing an Oral Research Masters Examination, as described below. Doctoral students in ACMS will have passed the Oral Research Masters Examination upon completion of the Oral Candidacy Exam for the doctorate.

**Oral Research Masters Examination** The oral examination, taken after the written examination has been completed, focuses on an "advanced" topic, taken from advanced research texts or articles. This work will be performed under the supervision of an ACMS advisor who must be a regular or concurrent faculty member in ACMS. For students in the ACMS doctoral program, the doctoral advisor will also be the master's advisor. The student should begin working on the advanced topic under the ACMS advisor's supervision, well in advance of the examination. The material to be counted as the advanced topic must have the approval of the student's adviser and the Director of Masters Programs or DGS.

The board of examiners for the oral candidacy examination consists of three examiners including the advisor. The other members of the examining board are selected by the DGS (based on suggestions of the student and adviser). At least two of the examiners must be tenured or tenure-track faculty members of ACMS.

The topic for the oral examination should be chosen months before the examination. The syllabus for the oral examination must be made available to all members of the examining board at the time they agree to serve. All examiners should restrict their questions to the advanced topic or other material on the given syllabus. Thus, the syllabus should provide guidance to the examiners.

The oral examination begins with a presentation by the student lasting between 30 and 40 minutes. This is followed by questions on material from the syllabus. The examination lasts from one and a half to two hours. After the completion of the examination, the four examiners vote "pass" or "fail." A vote of "pass" means that, in the eyes of the particular examiner, the student has passed all parts of the examination. The student is considered to have passed the oral candidacy examination only if at least three of the four examiners vote "pass". The student is informed of the outcome of the examination immediately.

If the oral examination serves as the oral candidacy examination for a doctoral student in ACMS, the examiners first vote on the proposal to pass the student to Ph.D. candidacy. If the student fails the examination at this level, the examiners vote on the proposal to pass the student at the master's level. If the student passes at the

doctoral candidacy or the master's level, then the student passes the oral examination for the master's degree.