

# Agricultural and Biosystems Engineering

## Department Information

- **Acting Department Chair:**  
Ken Hellevang, Ph.D.
- **Graduate Coordinator:**  
Igathinathane Cannayen, Ph.D.
- **Department Location:**  
Agricultural and Biosystems Engineering Building
- **Department Phone:**  
(701) 231-7261
- **Department Web Site:**  
[www.ndsu.edu/aben/](http://www.ndsu.edu/aben/) (<http://www.ndsu.edu/aben/>)
- **Application Deadline:**  
International applications are due May 1st for fall and August 1 for spring. Domestic applications must be received at least one month prior to the start of the semester.
- **Credential Offered:**  
Ph.D., M.S.
- **English Proficiency Requirements:**  
TOEFL ibt 79; IELTS 6.5; Duolingo 105

## M.S. Degree

The M.S. degree program requires completion of 30 semester credit hours beyond the baccalaureate degree as detailed below. A Plan of Study (PoS) should be developed with the adviser by the end of the first semester of work. An oral examination covering the research-based paper or thesis and the student's understanding and ability to apply the subject matter to the research is required. Students typically require two years to complete their MS degree. An overall GPA of 3.0 or higher must be maintained.

The ABEN M.S. program requirements are:

Code	Title	Credits
<b>Didactic Course Work (601-689, 691; 700-789, 791; 800-889 and 891)</b>		<b>16</b>
ABEN 790	Graduate Seminar	
Additional Credits (as needed to complete 30 total credits)		
ABEN 798	Master's Thesis	6-10
<b>Total Credits Required</b>		<b>30</b>

\* Minimum of 6 credits of NDSU ABEN courses numbered 601-689, 691; 700-789, 791

### † Degree Requirements for the Accelerated M.S. Program in Agricultural and Biosystems Engineering

Students pursuing an accelerated master's degree in ABEN must complete the following requirements:

- 30 credits after the B.S. is required. However, a maximum of 15 graduate credits earned during the combined/accelerated degree program may also be counted toward the graduate degree.
  - 20-24 credits are from didactic course work, while 6-10 credits are typically devoted for a master's thesis based on research
  - A minimum of 6 credits of NDSU ABEN courses numbered 601-689 and 700-789 is required.
  - ABEN Graduate Seminar (ABEN 790).
- 
- 30 credits after the B.S.
  - 20-24 credit hours are from course work, while 6-10 credit hours are typically provided for a master's thesis
  - A minimum of 6 credits of NDSU ABEN courses numbered 601-689 and 700-789 is required
  - ABEN Graduate Seminar (ABEN 790)

## Ph.D. Degree

Ph.D. candidates are encouraged to indicate their research interests when applying for admission and to select an adviser before entering the program. Typically, 3-4 years are required to complete the Ph.D. program after the completion of an M.S. degree.

The degree requirements are in accordance with the NDSU Graduate School requirements. The student's academic adviser will usually be selected during the acceptance process. Prior to the end of the first academic year, the student and academic adviser will arrange for appointment of a Graduate Advisory Committee.

The student and major adviser will prepare a Plan of Study by the end of the first year in residence. The student's Graduate Advisory Committee, the ABEN Department Chair, and the Dean of the Graduate School shall approve the Plan of Study. The Plan of Study (PoS) must be filed in the Graduate School of NDSU. An overall GPA of 3.0 or above must be maintained.

The ABEN Ph.D. program requirements are:

Code	Title	Credits
<b>Didactic credit (601-689, 691; 700-789, 791; 800-889 and 891)*</b>		<b>27</b>
ABEN 899 and ABEN 790		<b>30-45</b>
<b>Additional Credits (as need to complete 60 credits (post-master's) or 90 credits (post-bachelor's))</b>		
<b>Total credits</b>		<b>60-90</b>

\* at least 15 credits of which must be 700-800 level and a minimum of 9 credits must be ABEN courses.

- 60 credits after the M.S. or 90 credits after the B.S.
- A minimum of 27 credits from NDSU courses numbered 601-689 and 700-789, at least 15 credits of which must be numbered 700-789
- A minimum of 30 credits of NDSU ABEN dissertation and graduate seminar after the M.S. or 45 credits after the B.S.
- A minimum of 9 credits of NDSU ABEN courses numbered 601-689 or 700-789, 15 credits if entering with other than an ABEN B.S.
- ABEN Graduate Seminar (ABEN 790)
- It is expected that one or more journal articles will be submitted for publication prior to the award of the degree.

\*Any student receiving an M.S. or Ph.D. degree from the NDSU ABEN department must have taken the following fundamental courses prior to attaining the graduate degree. If the courses (or their equivalent) were not taken prior to matriculating at NDSU, they should be taken in addition to other coursework required for the graduate degree.

- Differential Equations (NDSU: Math 266)
- Statics (NDSU: ME 221) and Dynamics (NDSU: ME 222); these two may be substituted by a calculus-based Physics I class
- Thermodynamics (NDSU: ME 350); may be substituted with ABEN 644 which may also count toward graduate degree
- Fluid Mechanics (NDSU: CE 309 or ME 352)
- Physics II/Electricity and Magnetism (NDSU: PHYS 252)

The major adviser may appeal to the ABEN Graduate Committee (not the student's graduate advisory committee) for substitutions or waivers of these requirements.

## Examinations

**Comprehensive Examinations:** Both a written and an oral examination will be taken after completion of the greater portion of the course work phase of the Ph.D. program. The written examination will be conducted to test the student's understanding and ability to apply the subject matter related to the chosen research area(s). The format and sequence of the written and oral examinations are dependent on the academic adviser and the examining committee. The examination will be graded pass, fail or marginal pass. If the student does not pass the written component of the comprehensive examination, the student will be provided another opportunity to pass the examination. If the student does not pass the written examination second time, the student must wait one semester before taking the examination for the third time. Failure of the third attempt will prevent the student from proceeding further in the Ph.D. program.

The oral examination will also be coordinated by the academic adviser. In this examination, the student will be required to provide a short presentation of the research progress to the date of the oral examination. The format of the examination is dependent on the academic adviser and the examining committee. This examination is to assess the student's ability to communicate his/her research problem, and how he/she is applying scientific and engineering principles to solve the research problem. This examination may be used by the committee to further ascertain the student's level of understanding of subject matter as observed from the written examination. This examination is graded pass or fail. If a student fails the oral examination, the student will be advised of the deficiencies and will be given a second opportunity to pass the examination. Should both attempts to pass an examination result in failure, the candidate may request to take the examination a third time. A request for a third examination requires the support of the supervisory committee, the Department Chair, and the Dean of the Graduate School after consultation with the Graduate Council. Failure of the third attempt will prevent the student from proceeding further in the Ph.D. program.

Successful completion of both written and oral examinations will formally admit the student into candidacy for the Ph.D. in Agricultural and Biosystems Engineering. At least one semester must elapse between admission to candidacy and final PhD. oral examination of the dissertation.

**Final Examination:** After the research work is completed, the student will write a Ph.D. dissertation following the guidelines of the Graduate School. The final oral Ph.D. examination will be arranged after the approval of his/her academic adviser. The complete Ph.D. dissertation will be distributed to the examining committee members a minimum of one week before the final examination. The student will present the complete research work during this final examination. After passing the final examination, the student will complete all the appropriate suggested changes of the committee. The student will follow the procedures as defined by the Graduate School to complete the submission of the Ph.D. dissertation.