# Department Honors Program

# Joint Department of Biomedical Engineering

Please see this website for full details of the requirements to complete Departmental Honors: <https://bme.unc.edu/student-opportunities/honors-program/>

This form focuses on the independent research requirement and must be completed and approved to enroll in BME 491 (NCSU-based students) / BME 691H (UNC-based students). The project proposals are approved for the entire year. For the spring semester, only an updated signature page is required for enrollment into BME 492 (NCSU-based students) / BME 692H (UNC-based students). Please read these important points carefully before completing the application. When complete (including signatures), email as a Word doc or PDF to BME Student Services at bme\_student\_services@ncsu.edu or bme\_student\_services@unc.edu. Name the document by this convention: Last\_First\_course number\_Form.

* Students must identify an appropriate BME faculty mentor themselves; one will not be assigned. Tips on finding a faculty mentor here: <https://bme.unc.edu/wp-content/uploads/sites/917/2021/08/Undergrad-Research-Guide-1.pdf>
* If a BME student selects a research advisor who is not a BME faculty member, they must find a BME faculty member who can serve as the Instructor of Record. This IOR will not be provided, but if you are having trouble please ask your research advisor or the Director of Undergraduate Research. The IOR will assign the grade in consultation with the research advisor.
* Please adhere to the following deadlines, as it will typically take ~3 weeks for review by the BME Undergraduate Research Committee. Revisions may be needed, and final approval must be obtained before the first day of classes. The Student Services Coordinator of the home campus will perform enrollment after final approval.

|  |  |
| --- | --- |
| Spring (full application\*)  | First Monday in April |
| Summer (full application\*)  | Second Monday in July  |
| Fall (updated signature page) | Third Monday in October |

\* Students who need to know if their application for fall enrollment is approved for planning

purposes should choose the Spring deadline. Otherwise, there is no difference in the Spring and Summer deadlines.

**APPLICANT INFORMATION (to be completed by the student):**

Student Applicant’s Name:

PID/Student ID:

E-mail:       Phone #:

Date of Application:

Major:

Class during the year you are pursuing honors: [ ] Senior [ ] Other (explain)

Course Number – Please check: [ ] BME 491 (NCSU, fall) [ ] BME 492 (NCSU, spring) \*

 [ ] BMME 691 (UNC, fall) [ ] BMME 692 (UNC, spring) \*

 \* Only an updated signature page is required for the 492 / 692 applications.

Current GPA (Cumulative):

 Note: Students must have a 3.3 GPA for honors. See website for details.

Please check all that apply: [ ] Graded

Are you being paid for this research? [ ]  YES [ ]  NO

**Descriptive Title of Research Project**

**RESEARCH ADVISOR:**

Name:       Department      Home Institution

E-mail:       Phone number

***Note:*** An alternate Instructor of Record must be assigned if the research advisor is not a primary faculty member of the Joint BME Department.

**INSTRUCTOR OF RECORD, if different from Research Advisor:**

Note: The Instructor of Record must be a member of the Joint BME Department and is responsible for assigning the grade in collaboration with the research advisor and submitting all necessary documentation to student services.

Name:       Department      Home Institution

E-mail:       Phone number

**COURSE REQUIREMENTS (to be completed by the Research Advisor and discussed with the student)**. This is considered a contract between the research advisor and the student. Deviations from this contract should be updated and documented to the extent possible by the research advisor and student. Students are expected to devote at least three hours of independent work per week for each unit of credit (e.g., 9 hours per week if 3 credit hours).

1. Meeting requirements with the research advisor (e.g., individual meetings, lab meetings, etc.). Include day/time of weekly or bi-­‐weekly meetings:

b. Reading assignments (and due dates, if relevant):

1. Written thesis (required). The thesis should be sent to the committee members **at least 1 week before the oral defense** and corrections may be requested. The final thesis will need to be submitted by the Instructor of Record (email to bme\_student\_services@ncsu.edu or [bme\_student\_services@unc.edu](file:///C%3A%5CUsers%5Cmkmowery%5CDocuments%5Cbme_student_services%40unc.edu) ). We will use the UNC deadline for all students, which is usually **early April** and can be found here: <https://honorscarolina.unc.edu/research/senior-honors-thesis/>

\* UNC-based students must also submit a thesis report “signature page” and must upload the thesis to the Carolina Digital Repository by the final day of classes.

If one of the following formats will be followed (the decision doesn’t have to be made at this time), write “confirmed”: here:

**Format 1:** Fully written paper in which the honors student is the first or co-first author. This should be at least “close” to submission to a journal. This format should be chosen for UNC-based students pursuing the goal of “highest honors”.

**Format 2 (anticipating Honors):** This may resemble the final report of a two-semester independent study and would still be written in the format of a scientific paper (Introduction, Methods, Results with data in the form of figures/tables, Discussion, References). It is ok if the maturity/amount/quality of the data does not quite meet the level required for submission to a journal. This format should be chosen for UNC-based students pursuing the goal of “honors”. General guidelines of 12-20 pages at 1.5 line spacing, 1 inch margins, Arial 11. Can exceed page limit to account for large figures and references.

1. Oral thesis defense (required). The recommended format is a 25-40 minute presentation to a committee of at least 3 members. The research advisor and instructor of record (if there is one) count as part of the 3; one of the 3 can be a graduate student or post-doc. After the presentation there should be 15-45 minutes of questions and discussion. If this format will be followed, write “confirmed”: here:
2. **Seminar Attendance.** Students will attend two seminars each semester from the [BME seminar series](https://bme.unc.edu/home/news-events/coulter-seminar-series/) or other approved seminars for two semesters. [This form](https://docs.google.com/forms/d/e/1FAIpQLScZS4bHejRYIxcXTSuY33bmEBTRzcoov7J2S_IgiUx25HCDDQ/viewform) should be submitted for each seminar attended and includes space for a brief summary of the talk.

<https://docs.google.com/forms/d/e/1FAIpQLScZS4bHejRYIxcXTSuY33bmEBTRzcoov7J2S_IgiUx25HCDDQ/viewform>

1. **Grading.** If following the rubric at the end of this form, write “confirmed”. If different criteria or percentages will be used, explain the criteria here:

UNC-based students (BMME 691) will receive a grade of “SP” for “satisfactory progress”, if appropriate, for the first semester. The grade given for the Spring semester will be applied to both semesters of credit. This is because the primary deliverables are in the Spring.

NCSU-based students (BME 491) will receive a grade for the first semester. Instructors should assign a grade based on the deliverables that are most appropriate for each project at that time.

g. Other information:

**PROGRAM OUTCOMES**

For the Program Outcomes below, specifically describe how the research project will

address the outcome. Do not cut and paste from the proposal. Typically, the student will draft these outcomes along with the proposal and get feedback from the research advisor.

o All seven of the outcomes must be addressed

o At least **three** **of outcomes** **1, 2, 3, 6, and 7** must be checked as substantial. You still need to address the others, but they can be marked as “no” for substantial. At least 2-3 sentences are expected for outcomes that are marked as “substantial”.

1: *An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.*

**Substantial?** **[ ]  Yes** **[ ]  No**

>Describe the problem to be addressed, and the general relevant principles. List the courses (numbers) that taught the original scientific and engineering concepts, e.g. BME 205, BMME 298, BME 301, BMME 335, BME 345, etc. For senior level electives, this independent study/research project should draw upon knowledge learned in junior level courses.

2: *An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.*

**Substantial? [ ]  Yes [ ]  No**

>Briefly describe the engineering design component(s) of the project, for example, a tool or device that will be designed, an analytical model that will be developed, or a process that will be created. Describe how the solution considers listed factors.

3: *An ability to communicate effectively with a range of audiences.*

**Substantial? [ ]  Yes [ ]  No**

>Describe any written reports or other materials, poster presentations or oral presentations required. Note that for honors the written thesis and oral defense are required and should be stated here.

4: *An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.*

**Substantial?** [ ]  **Yes** [ ]  **No** **\*Note: this cannot count towards the 3 required substantial**

>Describe the ethical implications of the project and professional responsibilities from an engineering standpoint, including the potential scope of the project’s impact.

5: *An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.*

**Substantial?** [ ]  **Yes** [ ]  **No \*Note: this cannot count towards the 3 required substantial**

>Describe the team environment for this project, including the student’s role, and the roles of others associated with the project and/or the research group. How are the components of this outcome met?

6: *An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.*

**Substantial? [ ]  Yes [ ]  No**

>Describe the student’s role in developing the experimental approach and the protocols, and in the analysis and interpretation of data. Where is engineering judgement applied?

7: *An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.*

**Substantial? [ ]  Yes [ ]  No**

>Describe what new knowledge, including skills, the student will need, and how it/they will be acquired.

**RESEARCH** **PROPOSAL**

**This proposal should be discussed with the advisor, drafted by the student, and edited by the advisor**

**For honors, the proposal should cover the work proposed for both semesters. There will not be an additional project proposal for the second semester.**

Attach a detailed description of the planned project, approximately 1000 words (2 pages single spaced) not including references and figures. This proposal must be written by the student and should not contain material taken directly from grant proposals, research program descriptions or posters/publications from the research advisor’s group. If the project is part of a larger and/or ongoing research program, the proposal should clearly indicate what will be done by the student. Use of the first person is encouraged. Suggested format is that of a research proposal including introduction, methods, specific aims and research plans. The proposal should be comprehensible to individuals outside the specific area of research, for example, adequate background should be provided, acronyms should be spelled out and technical terms should be explained. Include a bibliography in standard format, citing all appropriate references. Submit the proposal as a separate Word of PDF document with a title “Last\_First\_course number\_Proposal.” Email it to bme\_student\_services@ncsu.edu or bme\_student\_services@unc.edu along with the completed application form.

**Student, Faculty and Administrative signatures**

**RESEARCH ADVISOR, INSTRUCTOR OF RECORD AND STUDENT RESPONSIBILITIES:**

Your typed name below indicates that you have read the requirements expected from you as a student/instructor, agree to undertake these responsibilities, and will abide by the relevant Honor Code. It is not necessary to obtain a written/digital signature. Your typed name in the appropriate box is sufficient Students may only type the name of the research advisor/instructor of record if they have received explicit permission to do so.

Research Advisor      Date \_

Instructor of Record, if

different from Research Advisor       Date \_\_     \_

I have read the requirements expected of the student, agree to undertake these responsibilities, and will abide by the Honor Code’s responsibilities of students.

Student       Date

**\*INDEPENDENT STUDY COORDINATOR**

**This application for Independent Study has been reviewed. The proposal is**

[ ] APPROVED AS IS

[ ] REQUIRES MORE INFORMATION (provide details and return to instructor and student)

[ ] NOT APPROVED (provide rationale)

School/Department/Program Independent Study Coordinator Date

* If the Independent Study Coordinator is not the Department/Curriculum Chair, the Director of Undergraduate Studies (DUS), or another Faculty Designee of the Chair, then the Chair or the DUS must also approve this contract.

**\*\* CHAIR OR DIRECTOR OF UNDERGRADUATE STUDIES (whichever is applicable):**

This application for Independent Study has been reviewed. The proposal is

[ ] APPROVED AS IS

[ ] REQUIRES MORE INFORMATION (provide details and return to instructor and student)

[ ] NOT APPROVED (provide rationale)

Chair/Director of Undergraduate Studies/Faculty Designee/SAD Date

**\*\*** If the Chair is the student’s independent study instructor, this form must be signed by the Chair’s Senior Associate Dean (SAD).

Note: Departments/Curricula must maintain copies of this contract for a minimum of two years

**Independent Study or Research for Academic Credit grading rubric (submit to Undergraduate Office upon project completion)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | *poor or incomplete (below 65 pts)* | *moderate or developing (65 -74 pts)* | *competent and nearly complete (75 - 84 pts)* | *accomplished (85 -94 pts.)* | *exemplary (95-100 pts.)* |
| Development | Incomplete understanding | Understands the | Able to understand the | Able to understand the | Able to understand the |
| of Research | of the problem, research | problem, the research | problem, the research | problem, devise a | problem, devise research |
| Plan | strategy, and limitations | strategy, and the | strategy, and the | research strategy that | approach independently or |
| (15%) | when assisted by the | limitations of the | limitations or the | can be implemented | suggest a novel approach, |
|  | instructor | approach when assisted | strategy when explained | with limited assistance, | and demonstrate a solid |
|  |  | by the instructor, but | by the instructor | and consider limitations | understanding of the |
|  |  | requires a high level of |  | of the research method | limitations of the proposed |
|  |  | supervision |  |  | research method |
| Execution of | Does not complete the | Completes a small | Completes the majority | Completes the research | Completes the research |
| Research | research protocol, is | component of the | of the research protocol | protocol and | protocol and demonstrates a |
| Plan (25%) | unreliable, and is not | research protocol and | and demonstrates | demonstrates | high skill level with all of |
|  | competent with the | demonstrates | proficiency with the | proficiency with the | the research methods and |
|  | research techniques | proficiency in some of | majority of the research | research methods and | techniques |
|  |  | the research methods | methods and techniques | techniques |  |
|  |  | and techniques |  |  |  |
| Data | Does not complete the | Completes some, but | Nearly completes the | Completes the data | Completes the data analysis |
| Analysis | data analysis or | not all, of the data | data analysis or requires | analysis without need | without correction and is |
| (30%) | demonstrates | analysis or needs | some minor correction | for correction | able to independently |
|  | incompetence in the data | frequent correction |  |  | understand and analyze the |
|  | analysis methods |  |  |  | significance of the data |
| Written | Does not complete the | Misses some major | Completes the major | Completes the major | Manuscript is complete and |
| Report | written report, incorrectly | features of the results, | points in the abstract, | points in the abstract, | well-written. Figures and |
| (15%) | reports the results, is | or tables; figures and | introduction, methods, | introduction, methods, | tables are complete and |
|  | unable to write an | text need significant | results, conclusions, | results, conclusions, | well-designed. All |
|  | abstract, poor | editing | and references; | and references; | important conclusions of the |
|  | construction of tables and |  | completes figures and | completes figures and | research are accurately |
|  | figures |  | tables; but some editing | tables. | reported in the manuscript. |
|  |  |  | and corrections remain |  |  |
| Oral | Unable to communicate | Arguments are unclear | Arguments are | Arguments are clear. | Presentation is well |
| Presentation | and articulate the methods | and poorly structured. | sometimes unclear. | Presentation follows a | articulated. Findings are |
| (15%) | and conclusions in a way | Does not present the | Some material is not | logical order. Material | presented in an appropriate |
|  | that others can | material at a level | presented at a level | is presented at the | style and format. Grammar |
|  | understand; Grammar is | appropriate for the | appropriate for the | appropriate level. | is excellent. Uses media |
|  | poor | audience. Some | audience. |  | effectively. |
|  |  | grammatical errors. |  |  |  |

|  |  |
| --- | --- |
|  | *Points = % x pts.* |
| **Development of Research Plan****(15%)** |  |
| **Execution of****Research Plan (25%)** |  |
| **Data Analysis (30%)** |  |
| **Written****Report (15%)** |  |
| **Oral Presentation****(15%)** |  |
| **TOTAL****POINTS (100%)** |  |

|  |  |
| --- | --- |
| Range | Grade |
| 92 - 100 | A |
| 90-<92 | A- |
| 88-<90 | B+ |
| 82-<88 | B |
| 80-<82 | B- |
| 78-<80 | C+ |
| 72-<78 | C |
| 70-<72 | C- |
| 68-<70 | D+ |
| 62-<66 | D |
| 60-<62 | D- |
| <60 | F |