

MMG499/499H Undergraduate Research (1-3 credits, 6 credits max)

MMG492 Undergraduate Research Seminar (1 credit)

Undergraduate research is an important component of the MMG majors, as students that are actively involved in the scientific process benefit from the application of knowledge toward critical thinking and problem solving. Students are encouraged to seek laboratory opportunities that align with their interests and future goals. Once accepted into a laboratory, it is expected that students will receive training on laboratory safety and support tasks as well as specific techniques that are relevant for the research being conducted in the lab. Additionally, as part of this research experience, students should be guided through tasks that will develop their scientific written and oral communications skills.

With permission from the research professor, students may enroll in MMG499 or MMG499H to earn academic credit for working in the laboratory. While the specific requirements for these credits are arranged by the professor and student, the MMG department has found that students gain the most benefit when they are engaged in a semi-independent research project that falls within the laboratory's overall research goals. To this end, the MMG department requests that research experiences for undergraduate students aim to develop the following competencies:

- appreciable understanding of the research question.
- ability to develop, evaluate, and assess the experimental design for the project.
- collection and reading of relevant primary research and review articles.
- mastery of lab-specific techniques, as appropriate.
- experience in conducting the experiments to the fullest extent possible.
- analyze experimental data to formulate conclusions.
- **communicate the research study** (including results and conclusions) in written and oral form, eg. Written proposal, short reports, applications for scholarships and/or awards, lab meeting presentations.

The assessment of individual student accomplishment for MMG499 is based on the student's ability to demonstrate achievement of the competencies above and may additionally include:

- pre-determined number of hours per week spent in the lab
- participation in lab meetings and other examples of lab citizenship
- appropriate documentation of work (lab notebook)
- written proposal and/or summary

MMG 499H: Students enrolled in the **MMG 499H** (Honors) section are expected to perform above and beyond the level of typical undergraduates, eg. through exceptional research effort, presentations outside of lab meetings such as other campus venues, additional written reports, participation in authoring and/or editing a document intended for publication.

Research professors will be asked to submit a grade that reflects the student's effort. Students that are reliable, fully engaged in the lab, and making reasonable progress on the research objectives usually earn 4.0. Students with occasional absences, and are making slower progress in the mastery of lab techniques and comprehension of relevant concepts may receive 3.5 or lower. Questions

concerning the grading process should be addressed to either Jeannine Scott (scottj21@msu.edu) or Scott Mulrooney (mulroon2@msu.edu).

To complete the MMG capstone experience, students must formally present their research project in a public setting. This may be accomplished by completing **MMG492, Undergraduate Research Seminar** (1 credit), during which students use their research project to write an abstract, create figures, and assemble a poster for presentation at the University Undergraduate Research and Arts Forum (UURAF) or some other pre-approved event.

MMG students may request that MMG492 be **waived** if the following criteria will have been met:

- 2 credits of MMG499 completed.
- preparation of a research poster or oral presentation as directed by the PI or lab supervisor.
- presentation of their research project at a formal event.

Students should consult with Dr. Scott to request a waiver of MMG492.

Please send the following to scottj21@msu.edu by the 2nd week of semester of enrollment

- *signed agreement form*
- *1-paragraph description of the research project prepared by the student in the form of an abstract*

Use this form to document the agreement between professor and student regarding undergraduate research being conducted for credit.

Note for student: Please prepare a 1-paragraph description of the research project that you will be working on for these credits and send it to scottj21@msu.edu. Please include your name on the document.

Student Name: _____

Semester/Year: _____

Course code: _____

Number of credits (1-3): _____

Intended Presentation (UURAF, MID-Sure, Symposium, etc.): _____

Signatures:

(student name – please print)

(student signature)

Date: _____

(professor name – please print)

(professor signature)

Date: _____