

## **Course Description – Summer 2019**

### **EMA 4914 – Research in Materials Science & Engineering II**

**Catalogue**

**Description:** Substitution of Summer Internship/Co-Op for Senior research in materials science & engineering, including a final thesis/report.

**Text:** No text required

**Reference Texts:** as needed

**Instructor:** Gerhard E. Fuchs  
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Office Hours: TBA

**Prerequisite:** Senior level standing and a summer internship/co-op in an MSE field.

**Course** To introduce the student to methods or research in an MSE field and to substitute for senior research.

At the end of the course, the student should complete a research report/thesis describing the work that was performed during the internship/co-op.

**Prerequisites  
by Topic:**

Inorganic Materials, Organic Materials, Mechanical Behavior of Materials, Engineering Statistics, Materials Laboratory.

**Topics:**

1. Global Awareness, Diversity and Engineering Ethics
2. Making Effective Technical Presentations
3. Experimental Design/Error Analysis
4. Safety/ Draft of Experimental Protocol Due
5. Presentations of Protocol/Research Progress
6. Written research report/thesis due within 2 weeks of completion of the internship/co-op.

EMA4914 provides 3 credits towards Engineering Sciences and Engineering Design.

This course addresses the following MSE Program Outcomes:

1. To acquire and demonstrate knowledge in mathematics, science engineering basics, and the fundamentals of materials science and engineering. (Intermediate coverage)

This course develops the fundamental strategy in the approach to, and solution of, engineering research and/or design problems.

2. To apply mathematics, science, engineering basics and fundamentals of materials science to envision solutions to engineering problems and to solve engineering problems. (High Coverage)

This course is a capstone course in that it is intended to utilize all of the previous and current course material in solving engineering problems.

3. To design and execute experiments to solve engineering problems, and to analyze the results of those experiments. (High Coverage).

The basis of the course is the design and execution of experiments to solve an engineering problem. The recording of appropriate data, statistical analysis of that data, the technical analysis of data and reporting in an acceptable form is the essence of this course.

4. To design a materials system or process to meet desired needs. (High Coverage)

The students are required to fabricate or obtain materials and measure properties for those materials. In many cases this requires the design and manufacture of a new testing apparatus. In other cases, a new material needs to be formulated to meet certain design needs. These are typical types of projects in these courses.

5. To work effectively in multi-disciplinary teams. (Low Coverage)

As part of their work in the laboratory, the students are expected to work with graduate and other undergraduate students. We discuss the importance of diversity of disciplines in solving engineering problems.

6. To communicate effectively regarding engineering issues. (High Coverage)

A lecture is given outlining the principles for presenting an effective technical oral report. The students are required to present this at least twice in one semester and once in the second semester. In addition a written protocol report is required, as well as a final report on their research or design topic.

7. To demonstrate a knowledge of issues affecting the practice of engineering as a professional, such as professional ethics and responsibilities, and sustained learning. (Low Coverage)

A lecture is delivered on engineering ethics. A discussion is held to sensitize the students to issues of conflict of interest, ethical practice in engineering, potential problems in the field, etc., and to present examples of recent ethical issues in engineering.

8. To demonstrate a knowledge of issues affecting society such as safety, the environment, the global economy, and intellectual property, and the impact of these issues on the practice of engineering. (Low Coverage).

All students are required to obtain safety training. This training is in preparation for safe practices in the laboratory. Lectures are presented on environmental issues as well as the patent process. The importance of accurate recording of data in an appropriate notebook is emphasized.

**Grading Scale: 93-100 A, 90-92 A-, 87-89 B+, 83-87 B, 80-82 B-, 77-79 C+, 73-77 C, 70-72 C-, 67-69 D+, 63-67 D, 60-62 D-, < 60 E**

Honesty Policy: All students admitted to the University of Florida have signed a statement of academic honesty committing themselves to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action. This statement is a reminder to uphold your obligation as a UF student and to be honest in all work submitted and exams taken in this course and all others. Any cheating/plagiarism/copying will be prosecuted to the fullest extent and a zero (0) given on the assignment.

Accommodation for Students with Disabilities: Students Requesting classroom accommodation must first register with the Dean of Students Office. That office will provide

the student with documentation that he/she must provide to the course instructor when requesting accommodation.

UF Counseling Services: Resources are available on-campus for students having personal problems or lacking clear career and academic goals. The resources include:

University Counseling Center, 301 Peabody Hall, 392-1575, Personal and Career Counseling.

SHCC mental Health, Student Health Care Center, 392-1171, Personal and Counseling.

Center for Sexual Assault/Abuse Recovery and Education (CARE), Student Health Care Center, 392-1161, sexual assault counseling.

Career Resource Center, Reitz Union, 392-1601, career development assistance and counseling.

Software Use: All faculty, staff and student of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.