Special Topic Syllabus
for
Fall 2022 SEMESTER

1. **Course Title**- ST-Vertically Integrated Projects **(**ENGR 4901/6901)

2. **Catalog Description**- This course provides students the opportunity to work in vertically integrated project (VIP) teams (maintaining a mix of freshmen through PhD students each semester) on interdisciplinary faculty-lead research**.** Much like a real-world engineering team, individual members work on different aspects of the project. Team members range from freshmen through graduate students, from first-time participants to students who have been involved for three or more semesters. Students take the course for one credit hour per semester. It is expected that students will enroll for three consecutive semesters to earn up to 3.0 hours of credit that may be counted as a technical elective**.**

3. **Required Texts and Other materials**-
   - *Entering Mentoring* by Christine Pfund, Janet Branchaw, and Jo Handelsman, 2015 (ISBN:9781464184901)
   - *Entering Research: A Curriculum to Support Undergraduate & Graduate Research Trainees* by Janet L. Branchaw, Amanda R. Butz, Amber Smith, 2nd Edition 2019 (ISBN:9781319263683)
   - *The Indispensable Guide to Undergraduate Research: Success in and Beyond College* by Anne H. Charity Hudley, Cheryl L. Dickter, Hannah A. Franz, 1st Edition 2017 (ISBN: 9780807758502)

4. **Prerequisites**- There is no prerequisite.

5. **Course Learning Outcomes/Objectives**-
   1. Develop and demonstrate independent research skills appropriate to the level of experience
   2. Develop and demonstrate mentoring skills appropriate to the level of experience
   3. Develop and demonstrate leadership skills appropriate to the level of experience
   4. Develop and employ teamwork skills appropriate to the level of experience

6. **Nature of Students to be Served**- Undergraduate and graduate level engineering students.

7. **Description of Course Methods**- The course will be taught through classroom lecture and/or workshops during a 3-hour timeslot to prepare and enable students to participate in one of two interdisciplinary research projects specified by the instructors. Each instructor will provide a project description based on their research and will form a VIP team based on enrolled student interest. There will be two VIP teams formed in the fall 2022 semester. VIP teams are faculty led and each faculty will add their own specific project details and research goals to set course expectations for the student outcomes. There will be an online application and the faculty member leading the VIP-team for their project will admit and permit students in their course section.

8. **Tentative Schedule-** The syllabus content is only intended to provide a solid foundation and framework in developing and applying research and mentoring skills, but the bulk of the work the students are expected to do is research as part of their VIP team.

Topic 1 (1 week): Introductions, overview of team's work, discussion of semester goals
Topic 2 (1 week): How to document tasks and research; maintenance of VIP research notebooks
Topic 3 (1.5 weeks): How to conduct an effective literature review
Topic 4 (1.5 weeks): How to read publications efficiently and effectively

Topic 5 (2 weeks): How to prepare oral and written research reports
Topic 6 (2 weeks): Best practices on conducting simulations and experiments, data acquisition and analysis
Topic 7 (1 week): Workshop on tools (e.g. excel, Matlab, and other statistics packages provided by UofM)
Topic 8 (1 week): Research ethics
Topic 9 (1 week): Workshop on entrepreneurship and innovation; industry presentation
Topic 10 (1 week): Workshop on mentoring

Graduate students *will be expected to attend a mentoring workshop before the semester begins to prepare them for the course since they will be expected to mentor from the start.*

9. **Course Methodology Grading Policy**-

The grade is based on three areas, along with three requirements. Although each student may work on different areas and contribute differently, they must show achievements in all three areas below and they will be assessed based on their level of experience. Students will be given a letter grade based on the following:

1. **Documentation and records (34%)**
    a. Design Notebook
    b. Wiki/blog documentation if used by team. ***Graduate students*** *will be expected to oversee the wiki/blog documentation.*
    c. Code (via GitHub) if used by team. ***Graduate students*** *will be expected to review and maintain the GitHub.*
2. **Personal accomplishments and contributions to your team's goals (33%)**
    a. Participation in VIP workshops and seminars;
    b. Quizzes, learning modules, essays, reports required by your adviser(s);
    c. Engagement in project;
    d. Pursuit of knowledge necessary for project;
    e. Contributions to the technical progress of the team;
    f. For more experienced members of the team, contributions to the management of the project may be expected. ***Graduate students*** *will be expected to mentor students and provide overall management of the project.*
3. **Teamwork and interaction (33%)**
    a. On-time attendance in meetings
    b. Actively contributing to overall team goals
    c. Coordinating activities with other team members
    d. Assisting other team members. ***Graduate students*** *will be expected to mentor and assist undergraduate students*
    a. Team Presentation(s)
    b. Peer Evaluations.
4. As part of the assessment of the above, each student is required to:
    a. Maintain a Design Notebook. Example notebooks are available at: https://vip.gatech.edu/vip-notebooks
    b. Complete the mid-term peer evaluation. This is a web-based form, and links are available at http://www.memphis.edu/vip. Failure to complete the peer evaluation will result in a full letter grade deduction. Late submissions will not be accepted.
    c. Complete the final peer evaluation, which will be available for one week at the end of the semester. Failure to complete the peer evaluation will result in a full letter grade deduction. Late submissions will not be accepted.

10. **Instructors of Record:** Chrysanthe Preza and Stephanie Ivey

11. **Instructional Method:** Conventional.