

Fail Often to Succeed Sooner (FOSS) *FOSS Cycles I and II*

Why you do it

“Fail Often to Succeed Sooner” is a key element of modern design practice. FOSS was championed by influential design firms such as IDEO. The basic idea is that it’s OK to make mistakes – every “failure” is an opportunity to learn valuable lessons that will eventually lead to success. Consider learning to ski – if you don’t fall down lots of times, you probably aren’t pushing yourself hard enough and it will take you longer to master the art of skiing.

Likewise, capstone projects should expect some initial failures. You can be sure that some your first ideas will end up not working the way you expected. You can also be sure that you will learn something useful from having tried the ideas. The sooner a team can try out a few ideas, even if the ideas turn out to be “wrong”, the sooner the team will be able to refine their ideas and the better their project will become. In general, the most successful capstone projects are those that make rapid progress early. Accordingly, the FOSS assignments are designed to help you get that early progress without overly constraining the details of your project.

FOSS Goals Preparation and Evaluation

In this course, there will be 2 FOSS “Cycles” in which teams submit lists of ideas/ approaches (which we will call FOSS Goals) that they want to explore. In each FOSS Cycle, the FOSS Goals are submitted and graded for quantity, completeness, and out-of-box thinking (“Submission phase.”) Then, a few weeks later (“Evaluation phase”), the team is evaluated for performance -- how well they addressed (though not necessarily met) their FOSS Goals. The FOSS Evaluations are rather low-stakes (worth relatively few points compared to other assignments). The team should basically just demonstrate that they are busy trying out several ideas.

For purposes of this course, almost anything can count as an idea or approach to explore – building a very quick prototype, doing a wide literature search, consulting an expert in the field, getting a small piece of code working. One very useful early step that many teams should consider is to perform a **teardown or cost analysis** of existing, related products. Simply working on team documentation is one of the few things that don’t count as a FOSS Goal.

FOSS Cycle I & II Submission

For the Submission Phase, you should submit the your team's FOSS Goals Sheet using the appropriate FOSS Goals Sheet. The due due dates for FOSS Cycle I and FOSS Cycle II are listed in the course schedule. You should list your FOSS Goals in the first column of the Sheet (use additional rows if necessary.) The Goals will be graded according to the associated rubric and returned rapidly to the team. The grading criteria are related to quantity of goals (at least 6 should be listed), the completeness of the goals (whether they cover all the non-trivial aspects of the project) and also out-of-box thinking (the team should have generated some original ideas through brainstorming.)

For simplicity, the FOSS Cycle I and II Goals Sheets are contained in the same document. Of course, you should only submit the relevant sheet in each FOSS Cycle.

Two items related to prototyping are required to be included in your FOSS Goals. Technically these should not be called FOSS Goals, but they are early and important steps that are tracked through the FOSS grading process.

- Your FOSS Cycle I goals should include **learning about prototyping facilities** that may be important for your project, especially OEDK facilities. E.g. if you think you might need to make some parts out of plastic, your FOSS Cycle I goals should include learning about the machine shop, 3D printer, and/or laser cutter in the OEDK. Or if your project will require building circuits, you should perhaps learn about the various electronic fabrication facilities, parts, and test equipment in the OEDK.
- The next required FOSS Goal (it can be in FOSS Cycle I or FOSS Cycle II) is to **obtain training** on the prototyping facilities you think your team will need to use. Conceivably a purely software-based project might not need to use "facilities", but even in this case you could include learning about the required computer platforms, languages, and development environments, if those are not already familiar.

FOSS Cycle I & II Evaluation

A few weeks after FOSS Submission, FOSS Evaluations will take place on the days listed in the course calendar. The team should schedule a FOSS Evaluation meeting with their appropriate course faculty member(s). The meeting should be brief, about 15-30 minutes usually, but check with the faculty members to set aside a sufficient amount of time.

During the FOSS Cycle I and FOSS Cycle II Evaluation meetings, the team should go over the corresponding FOSS Goals and describe how the team has addressed the Goals. The team should bring the relevant FOSS Goals Sheet with all three columns filled out (Goals, Results, and Next Steps) and also give a brief presentation explaining the Results and Next Steps. The presentation can be rather informal and can take place at the team's table, if

appropriate. The team should use slides, notes, or -- best of all, if possible -- a simple prototype to show how the FOSS Goals have been addressed.

Grading will be based on whether the FOSS Goals were addressed, not whether the Goals were met -- the emphasis is on *attempts* and *learning*, not success. It is OK to have failed, and it is OK to have substituted a different Goal based on learning the team acquired since the Submission phase. The main outcome to avoid is to have made little or no efforts.

An example FOSS Cycle I Goals sheet at the evaluation phase is shown at the bottom of this document. The hypothetical team in question is attempting to build a training system for baseball pitchers.

To summarize the **timeline of the FOSS process**:

FOSS Cycle 1 Submission -- early in first semester

Early in Design Cycle 1, the team will submit FOSS Cycle I goals – a list of at least 6 topics that the team wants to explore. The team should fill out the FOSS Cycle I Goals Sheet. The FOSS submission will be graded according to the associated rubric and rapidly returned to the teams.

FOSS Cycle I Evaluation -- a few weeks after FOSS Cycle I Submission

Later in the semester, the teams' performance against their FOSS Cycle I goals will be graded in a meeting with course faculty. Teams should bring an updated copy of the FOSS Cycle I Goals Sheet listing results and next steps for topics from the Submission phase.

FOSS Cycle II Submission -- about the same time as FOSS Cycle I Evaluation

Within a few days of your FOSS Cycle I Evaluation, your team should submit the FOSS Cycle II Goals Sheet. The format is identical to the FOSS Cycle I forms. The timeline between Submission and Evaluation phases is comparable to that in FOSS Cycle I. FOSS Cycle II Goals will be graded rapidly and returned to the team.

FOSS Cycle II Evaluation -- a few weeks after FOSS Cycle II Submission

The structure of FOSS Cycle II evaluations is essentially identical to that of FOSS Cycle I. Schedule a meeting with the appropriate course faculty during the evaluation period, bring the completed FOSS Cycle II Goals Sheet, and demonstrate how you have addressed your FOSS Cycle II Goals. It is encouraged, although again not required, to have a simple prototype to show.

Prototype Goals -- about the same time as FOSS Cycle II Evaluation

About the same time as the FOSS Cycle II Evaluations, the team will submit its First Semester Prototype Goals, to be evaluated at the team Design Review presentation at the end of the first semester. The details of the Prototype Goals process are described in another document, but briefly: unlike FOSS, Prototype Goals have to be specific and measurable. Evaluation of Prototype Goals is worth a significant number of points in Fall semester and even more in Spring Semester.

[FOSS Cycle I & II Rubric](#)

[FOSS Cycle I Goals Sheet](#)

[FOSS Cycle II Goals Sheet](#)

Below is an example of a FOSS Cycle I Goals Sheet at the Evaluation phase for a hypothetical team developing a training system for baseball pitchers.

FOSS Cycle I Goals		
Idea/ approach to explore	Result of exploration	Next steps
Talk to baseball coach about what team needs	1 discussion with assistant coach	Meet again after brainstorming with team
Look into performance/ cost of high speed camera	500 fps / \$10k; > 500 fps is v expensive	Max speed = 500 fps
Survey existing pitch analysis systems	MLB has 3d pitch analysis with stats; systems coming to colleges	
Take apart & attempt to reassemble a baseball	Really hard to put back together; seem to need special tools	Look into alternate materials for instrumented baseball?
Estimate size of Little League & college & pro markets	200,000 little league teams x \$200/ team = \$40M; College 60 teams x \$10k = \$6M; pro 30 teams x \$1M/ team = \$30M	Should try to address little league market
Look into body kinematic motion analysis via video	Meeting scheduled with expert at Baylor	TBD

[Add more rows as necessary]

