PURDUE UNIVERSITY | Elmore Family School of Electrical and Computer Engineering

ECE 47700
Policies Regarding Project Specific Design Requirements (PSDRs)

1.0 Overview of PSDRs:

ECE 47700 is a student-led design class in which projects are chosen by student teams and proposed to ECE 47700 course staff. Every project is different, but there still needs to be a method of determining whether the team of students has succeeded in their project endeavor and has met the ECE design requirements for the course. In the first five weeks of the course, each team develops and has approved a Project Functional Description and five Project Specific Design Requirements (PSDRs). The Project Function Descriptions are used to determine overall project success and the PSDRs are used to determine if the team has met the ECE design requirements for the course. Near the end of the course, each team has a Project Completion Demonstration where they show how much of their Project Functional Description they have achieved, and the result will determine their project integration grade. During this demonstration they will also show achievement of their PSDRs with the result determining their PSDR grade and meeting the ABET design requirement for the course.

To meet the course ECE design requirements, each senior design team must develop 5 distinct PSDRs and demonstrate them working. Successful demonstration of at least 3 PSDRs during the semester is necessary to for ABET design and therefore to pass the course. Due to the nature of the course, there are some hard rules, as well as some general guidelines, when it comes to selecting PSDRs. These rules and guidelines are detailed below.

2.0 Course Rules Concerning PSDRs:

There are a few hard rules regarding PSDRs. These are:

1. Course staff shall have the final determination on the validity and successful demonstration of any and all PSDRs. NO EXCEPTIONS.
2. All student teams must select 5 project-specific design requirements (PSDRs) as part of their design process.
3. In order to pass ECE 47700, all student teams must successfully demonstrate at least 3 PSDRs, 2 of which must be related to the student-implemented embedded hardware. For purposes of satisfying the course outcome, students may demonstrate preliminary PSDRs in lieu of final PSDRs. Final and preliminary PSDRs are explained in section 2.1, below.
4. Project-specific design requirements (PSDRs) based on the default functionality of a component are prohibited. This rule is further elaborated upon in section 2.2, below.
5. At least 3 of the project-specific design requirements (PSDRs) must be focused on the student-implemented embedded hardware. This is explained in section 2.3, below.
6. All project-specific design requirements should be phrased in terms of capabilities (“An ability to...”).

2.1 Preliminary and Final PSDRs

In order to fulfill one of the ABET outcomes for this course, and thereby pass ECE 47700, students must demonstrate 3 or more of their chosen PSDRs. To assist students in fulfilling this course requirement, PSDRs have been delineated by preliminary and final PSDRs.

Preliminary PSDRs are design requirements that have been demonstrated on the final hardware, but not necessarily in final packaging or in a fully system-integrated project. The final hardware

distinction is important; no prototyping or development hardware will be accepted for passing a PSDR. Successfully demonstrating a preliminary PSDR will provide the team with acknowledgment of passing the PSDR for the purposes of the course outcome. No points towards a student's grade are awarded for the demonstration of a preliminary PSDR.

Final PSDRs are design requirements that are successfully demonstrated on the packaged, fully-integrated final hardware. Successful demonstration of a final PSDR satisfies that PSDR from the perspective of the course outcome and additionally provides the student team with points towards their course grade. Final PSDRs can be demonstrated directly, however, it is recommended though not necessary to first demonstrate a preliminary version of the PSDR.

2.2 The Default Functionality of a Component Rule

In choosing PSDRs for a project, it is necessary that students choose requirements that will challenge and push them. As such, PSDRs which are based upon the default functionality of a component are prohibited.

One of the most common violations of this rule involves PSDRs focused around the use of a particular interface. At the time of this writing, projects utilizing wireless interfaces are extremely common, and many students write a PSDR of the general form “An ability to send/receive data via a wireless interface” (where the interface might be RF, Bluetooth, Wi-Fi, Zigbee, etc.). If a team is using an off-the-shelf solution for our interface, this is not an acceptable PSDR, as it largely comes down to hooking up the interface and configuring it.

Examples exist beyond interfacing. If a team has onboard memory, then a PSDR about storing data in memory would not be acceptable as a PSDR. If a team has been allowed to use a filter IC, a PSDR about filtering data, as done automatically by the filter IC, is not an acceptable PSDR.

A primary shortcoming of the violating PSDRs described above is a lack of detail in the PSDR. To improve the PSDRs and make them valid, one of the most common methods is to add detail to the PSDR in question. Instead of writing “An ability to send and receive data over a wireless interface” (an invalid PSDR), a valid PSDR could detail the types of data a team expects their system to collect and send over such an interface (an improved and probably valid PSDR).

Far more examples exist than can be reasonably listed here. If in doubt, follow the two golden rules when it comes to PSDRs. First, if a team thinks a PSDR is too easy, and is being done entirely by a component, it is likely that that PSDR will be invalid under this rule. Second, if a team has any doubts about a PSDR, ask course staff for further clarification.

2.3 Embedded Hardware Focus of PSDRs

ECE 47700 is embedded systems senior design. As such, the course is developed around embedded hardware, and the ABET outcomes for the course reflect this fact. Therefore, to be eligible for satisfying the educational outcomes of ECE 47700, at least 3 of the 5 PSDRs are required to be based upon the embedded hardware implemented by the senior design teams.

A common issue students encounter related to this rule is to have PSDRs that are performed on a general-purpose computer. PSDRs related to software written for a general-purpose software, such as GUIs, web-interfaces, etc. can be the focus of up to 2 PSDRs, but not more.