California Polytechnic State University
Industrial Technology Area

Senior Project (IT461/462)

General Information

Introduction
The senior project in Industrial Technology (IndTec) is a two-quarter, 4-unit (2+2) course and is the culmination of a student’s coursework in InTec program. The project will be independent work by the student while meeting certain course requirements and deadlines. Students are expected to complete the project in two consecutive non-summer quarters. The IndTec senior project must include a problem solving experience that incorporates the application of technology and the organizational skill. The project should offer a practical solution for a real-world problem in one of the following areas:

- exploring the solutions for improving operational management of a company
- developing, designing/building a prototype for a new product and exploring its commercialization aspect
- exploring the opportunities for using technology for welfare of society, e.g., use of sustainable energy, environmental-friendly products/operations, etc.
- analysis and testing of a new technology/material

The IndTec senior project must incorporate knowledge and skills acquired in earlier coursework. The project deliverables may include:

- A method/solution for fulfilling the identified “needs”
- A written formal report using specific formatting guidelines
- A poster and oral presentation
- Intermediate progress reports and email documentations to insure that the project is "on track"
Objectives

1) To apply the skills and techniques that students have learned during the undergraduate studies to real-world problems.

2) To provide a unique contribution to the body of knowledge through development of solution(s) for real world problems.

3) To acquire research, organizational and presentation skills through project works and development of a formal report.

Nature of Project

The senior project in Industrial Technology typically involves one or combination of the following developments:

- Developing a prototype or operational method
- Investigation for potential employers or industry partners
- Investigation/research under direction of a faculty
- Compare/test products or operations

In any case, a project entails identifying the problem, conducting literature review, collecting data, analyzing data, formulating alternative courses of actions, writing reports, making presentation and verifying solution/results. Some projects involve functional prototypes, not just mock ups, which can be used for testing and validation purposes.

Senior projects typically fall under one of the two broad categories: faculty-sponsored and industry-sponsored. The selected project should be related to one the focus areas of the Industrial Technology: operations technology and packaging technology. A closely-related area for a senior project is technology entrepreneurship. These projects must be developed considering the knowledge and skills gained in corresponding IndTec courses. Operations technology projects are typically related to supplier relations, distribution, operations management, process improvement, product design/ prototyping (IT233, IT260, IT326, IT371, IT403, IT406, IT410, etc.). Packaging technology projects are typically related to packaging design, testing and production (IT330, IT408, IT409, IT475, etc.). Technology entrepreneurship projects address issues of venture development, new business strategy and product commercialization (IT428, etc.).
BUS 310, etc.). Other projects that crossover the aforementioned areas or other IndTec courses will be also considered.

**Team vs. Solo Projects**

Senior projects are generally completed by teams of 2 to 3 students:

- Solo projects may be accepted in some cases. It is in benefit of students to work in teams for producing better results. It must be noted that typically, the workload of a solo project is not reduced proportionally compared to a team project.
- To identify the unique contributions of each student in a team project and facilitating the grading, each team member may generate one or two sections of the project independently.

Team projects tend to be highly rewarding and enjoyable to students. Be sure to work with the class instructor closely as you develop a team project.

The substantive foci of a senior project tend to be one of the following, or combinations thereof:

1. **Operations Technology**

   Typical acceptable subjects:
   - Streamlining of a production operation and/or identifying lean opportunities in manufacturing, assembly line, shipping/receiving, warehouse, material supply/distribution, quality, safety, etc. Examples of past projects:
     - "Redesign of a Small Production Cell Using Lean Manufacturing”
     - “Implementation of a Two-Bin Kanban System at Crystal Engineering”
   - Streamlining of operations and/or identifying lean opportunities in service/retail sectors. An example of past projects: "Lean Basics for Healthcare Practice"

   This kinds of projects should include a study of current operations in a company and a proposal for process improvements or development that should result in enhanced performance. A well-known operational analysis tool/principle such as value stream mapping (IT403), material flow analysis, Kanban, or 5S can be used. Alternative solutions should be analyzed and a practical, executable plan for the best solution be
presented. Significant visual (not just textual) documents such as CAD drawings of products, material flow diagram, plant layout, and/or VSM charts must be also provided. Some projects may require statistical analysis if numerical data are used for comparison of alternatives (STAT 217 or 218).

2- Packaging Technology

Typical acceptable subjects:
- Evaluation of various packaging materials
- Research on application and implementation of RFID in packaging systems
  An example of past projects: "Effect of Pallets and Products Configuration on RFID Readability"
- Evaluation of package designs
  An example of past projects: "Evaluation of Corrugated Bliss Boxes for Citrus Fruits"

This kind of projects involves designing and/or testing of product packaging and materials. All testing data along with an appropriate analysis, recommendations and/or an executable plan must be included in the final report.

Some projects may require statistical analysis if numerical data are used for comparison of alternatives (STAT 217 or 218).

3 - Technology entrepreneurship

Typical acceptable subjects:
- Develop a plan for launching a new company based on a novel (non-incremental) product/business solution in which the student has qualitatively and quantitatively verified the market opportunity, product development, preliminary testing, and developed fabrication/manufacturing plans. Target markets and barriers to entry must be specified.
- Product prototyping and commercialization
  This kind of projects involve studying similar products/systems in the market, designing a novel and non-incremental product or a significantly improved version of the product, fabricating and testing a prototype, material/process selection, and
documentation including CAD drawings, a bill of materials, and design verification. Target markets and barriers to entry must be specified. An example of past projects: "Design and Prototype a Square Vacuum Seal Container"

- Implementation, strategies, tactics and cost/benefit analysis of adopting a new technology. Target markets and barriers to entry must be specified.

**IT461 (1st Quarter)**

Typical activities in IT461 will be securing a project topic, performing background study, defining customer needs and project’s scope, literature review, collecting data and writing progress reports. A preliminary analysis and formulating alternative courses of action/solution can begin toward the end of the quarter. Two progress reports are required. A workload of 65 to 75 hours is expected.

**IT462 (2nd Quarter)**

Typical activities in IT462 will be analyzing the data, developing alternative courses of action/solution, making recommendations, concluding the project, writing progress/final reports, and prototyping. A project presentation and mid-term progress report are required. A poster presentation and final report are expected before final the exam week. A workload of 65 to 75 hours of is expected.

**How to find a topic for senior project?**

a. If you are working in a company as a part time student, ask your supervisor for a project. Make sure that the contact person gets a copy of [Guideline for Industry-Sponsored Projects](#) which can be obtained from the course instructor.

b. Contact a company for a project. Most IndTec faculty can provide you with contact information of several companies which have had relationship with IndTec program in recent years. Make sure that the contact person gets a copy of [Guideline for Industry-Sponsored Projects](#).

c. Some IndTec faculty may have one or two ideas for senior project.
d. Read archived IndTec senior projects in the library and see if there is an extension or incomplete aspect that would make a viable project. Many of the recent IndTec projects can be found on the library's Digital Common site:

http://digitalcommons.calpoly.edu/seniorprojects/

NOTE:
Before fixing your mind on a particular idea, consult with IT461’s instructors to discuss the viability of such idea for a senior project. Also, regardless of how passionate are you on a particular idea/plan/design, you must first develop alternative solutions through project works before proposing a final solution. This is an important part of a senior project development process.

Project Proposal

Once a potentially viable project is found and initially agreed by the course instructor, a project proposal must be submitted to the instructor for consideration and final approval. A proposal can be returned to the student for clarification or revision. We strongly recommend not to put off the securing of topic and submitting project proposal till last days. Students who fail to obtain final approval by the Friday of second week of classes will not have more time for project selection and may have to drop the class. A blank proposal form can be obtained by email from the instructor.

Senior Project Advisors

There are two key supervisory and administration roles for IT461/462- your course instructor and the technical advisor, whose roles are described as follows:

- The course instructor will manage organizational meetings, monitor the project progress and provide feedback to students for corrections and improvements. The IT461/462 course instructor will also handle academic administration of the course and will be responsible for grade determination.
It should be noted that the **course instructor** is expected to supply only general advice and guidance and to help the student avoid pitfalls and blunders; the day-to-day activities which affect the execution of the project are up to the student.

For 2013-2014 academic year, there will be two instructors for the IT461/462:

| **Professor Djassemi**: will supervise the operations technology and product development projects. |
| **Professor Saha**: will supervise packaging-related projects. |

- The **technical advisor** is a company's contact person for industry-sponsored projects or a faculty member for faculty-sponsored projects. The technical advisor will monitor the technical aspects of the project, the quality of the work done and providing feedback to the faculty advisor. You are responsible for determining who will be your technical advisor and including his/her name in the project proposal. The feedback from your technical advisor is one of the criteria for grading senior project.

  If you wish an InTec faculty to be your technical advisor, check to see if he has an opening. Because of voluntary nature of this advising service, IndTec faculty are recommended to limit the number of projects they are willing to advise to two.

**Some of the Project Constraints:**

1. The timetable of the class must be kept in mind as projects will be completed within two quarters (20 weeks) of one-student work.
2. The workload of the project should be within a range of 120-150 hours for one-student projects and 200-250 hours for 2-student projects.
3. For industry projects, the student should not be paid for the work done as senior project.
4. For Industry projects, the company must understand and agree with the scope and requirements of the project, so the student can have access to the site for data collection. A short guideline is available for an industry contact person to read.
5. Industry projects, in general, should not be classified or highly proprietary, although exceptions may be appropriate in certain circumstances. Students should be able to present their work in the normal academic settings of the university.
6. For industry projects, the project should not be in critical path of another project. Student must make sure that all information, hardware/software, etc. will be available on time for conducting the project tasks.
7. Bulk of project must be executed during the enrolled quarters. Some preliminary planning can be done prior to the enrollment. Work done prior to enrolled quarter will not be accepted. Work done under an internship program can not be counted as a senior project.
8. Once a project started, any major modification in project may result in grade reduction or mandatory course withdrawal.

Stages of Senior project and their relationship to common problem solving steps: