

## **IPRO 341 PROJECT PLAN**

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### **TEAM MEMBERS:**

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**COMMUNITY PARTNERS:** Museum of Science and Industry, Chicago

### **OBJECTIVES:**

The IPRO team will work with the staff from the Museum of Science and Industry to develop a prototype of a cardiovascular- mechanical function display of the changes in pressure and flow that occur at the moment of birth. The team will develop a computer-based display of the physiological functions in the pre-natal and neo-natal experience. A bench-top working model that demonstrates the closure of one of the fetal cardiovascular aspects will be developed to further illustrate the change in blood flow from fetus to newborn. Students will be exposed to the appropriate physiological and biological knowledge bases associated with the project. Students will develop the prototype and field test the display in the Museum for feedback and further refinement. Multiple skill areas are required to carry out this project: fluid mechanics, materials, physiology, control systems, interactive design capabilities, all of which will enhance the learning experience of this interdisciplinary group.

### **BACKGROUND:**

The Museum of Science and Industry has embarked upon a 6 year renovation of the science and health displays. The Museum is currently developing a number of new human physiology and health displays. It is hoped that the IPRO project could evolve into a display that could eventually be utilized in the Prenatal exhibit. IIT is involved in this experience as the Museum wishes to present more current scientific and engineering concepts to better educate the public on the relationships between physiology, pathology, and medical technology.

### **METHODOLOGY:**

The IPRO project team has determined a multi-step process. The initial phase has 4 teams. A two person team will investigate the potential computer animation programs available and useable to this project. Two other teams will read, synthesize, and present the essential physiological data for the pre-natal and neo-natal. Another 2 person team is preparing the

essential physiological knowledge on the moment of birth relative to the cardiovascular system. These will be presented in a PowerPoint format for easier assimilation into the computer display.

The next phase will involve refinement of the physiological data and the underlying scientific principles. After team critique, a preliminary computer display will be constructed.

The third phase will have the bulk of the class focusing on the creation of a mechanical demonstration device for one of the cardiovascular changes at birth.

The teams have purposely been created with a mix of engineering and biology students to insure an interdisciplinary perspective.

Each team presents results of research to the entire group for critique before progressing to the next level.

At the end of each phase a representative from the Museum of Science and Industry will attend the class and offer perspective and critique.

In order to insure that pertinent clinical and physiological data is accurate, two consulting physicians, one gynecologist and one obstetrician, have agreed to provide commentary and critique

### **EXPECTED RESULTS:**

The IPRO team will create a polished, scientifically accurate computer and mechanical display of the change in pressure and flow in the cardiovascular system that occurs at the moment of birth. The computer display will be user friendly and accessible in a learning manner to wide range of public users. The mechanical display will also be accessible to the same audience.

It is hoped that this one semester project will convince the Museum of Science and Industry to continue and maintain a long-term relationship with the Department of Biomedical Engineering and the University for future projects.

### **SCHEDULE OF TASKS AND MILESTONE EVENTS:**

The first portion of the semester is dedicated to information gathering and synthesizing the necessary information suitable for presentation. This includes both physiological and the underlying scientific data regarding pressure, flow, and resistance. The team will determine the organization and presentation of the data as well as how it can be best presented in a computer format.

A clearer picture of this process will be given in the mid-term report.

The second portion of the semester will comprise the refinement of the computer animation but will largely focus on the creation of a mechanical model.

The finished product will be evaluated and refined further after final consultation with Museum staff prior to presentation at IPRO Day.

**BUDGET/LIST OF ANTICIPATED EXPENSES:**

Software: \$500

Hardware: \$125

Heart model: \$100

Reference Books: \$400

Miscellaneous materials for mechanical model: \$250

**ASSIGNED RESPONSIBILITIES:**

The IPRO team has divided itself a requisite number of teams and will evolve the number and makeup as the project evolves throughout the semester. Each team has designated a leader/coordinator. Team makeup will reflect the interdisciplinary nature of the students. The students will decide on an overall team leader after a few meetings.