IPRO 309

Spring 2011
Project Plan

Orthotics and Prosthetics Education in Latin America

Advisor: Professor Kevin Meade

Prepared by: Mark Ende, Kaleyhia Flowers, Pablo Huang Zhang, Sevi Kocagoz, Julia Kuzel, Alexandra Luttinen, Esther Romo-Ortiz, Saad Sarvana, Bozhidara Svirkova, William Syvongsa

H.O.P.E
Helping in Orthotics and Prosthetic Education

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I. Team Charter

A.1 Team member roster

Names		Major	Email	Phone
Ende	Mark	Mechanical Engineering	mende@iit.edu	[redacted]
Flowers	Kaleyhia	Biomedical Engineering	kflowers@iit.edu	[redacted]
Huang	Pablo	Biomedical Engineering	phuangz@iit.edu	[redacted]
Kocagoz	Sevi	Materials Science and Engineering	skocagoz@iit.edu	[redacted]
Kuzel	Julia	Political Science	jkuzel@iit.edu	[redacted]
Luttinen	Alexandra	Mechanical Engineering	aluttine@iit.edu	[redacted]
Romo	Esther	Psychology	eromoort@iit.edu	[redacted]
Sarvana	Saad	Mechanical Engineering	ssarvana@iit.edu	[redacted]
Svirkova	Bozhidara	Molecular Biochemistry and Biophysics	bsvirkov@iit.edu	[redacted]
Syvongsa	William	Biomedical Engineering	wsyvongs@iit.edu	[redacted]

A.2 Team Values and Expectations

The expectation for all members in IPRO team is to complete the work they committed to in a timely manner. All members are expected to play actively in the team by showing up on time, become an active and enthusiastic participant and cooperate with teammates in a constructive and respectful manner. It is expected that all members should respond quickly via email or other communication methods in a timely manner. The members of the team should be prepared for every meeting, be able to present the appropriate materials that he or she is responsible for and be ready for productivity. It is highly recommended that if any member has any concerns or disagreements he or she should discuss it with other members in a professional manner. In case of absences, members are responsible for notifying the group and delivering any assignments due.

A.3 Team member strengths, needs, and expectations

Team Member	Skills	Learning Needs	Expectations
Ende, Mark (ME)	-Majoring in aerospace and mechanical engineering -Good background in materials -Completed both capstone design courses for mechanical engineering -Proficient in AutoCAD, Autodesk Inventor, EES, Microsoft Office -Extended interaction with people suffering from limited mobility -Basic knowledge of Visual FEA and MATLAB	-Continue improving communication with people from other disciplines -Learn more about quick response technology -Gain more knowledge in the field of O&P	-Continue to build off of the success of the past groups who participated in this IPRO -Help to further develop the educational material for O&P in South America -Learn more about quick response technology and O&P
Flowers, Kaleyhia (BME)	-Majoring in Biomedical Engineering -Previous research experience -Responsible worker	-Develop communication skills -Time management and organization -Become a better team player	-Learn more about O &P technologies -Make a decision about post-graduation course of action
Huang Zhang, Pablo (BME)	-Can speak Spanish. -Originally from Bolivia, where the medical situation there is similar. -Have experience working with people in need of help. This experience came from volunteering for 4 years at an orphanage in Bolivia. -Administrative Skills.	-Increase the knowledge in medical fields and what society today needs from Biomedical Engineers. -Increase experience working with a large group of people with the same focus, but different backgrounds.	-Overall expectation is that even as undergrads, we will be able to contribute to a population that needs a better medical care, but a greater understanding about medical developments today. -Understanding medical issues on the rise that need to be addressed.
Kocagoz, Sevi (MSE)	-Majoring in Material Science -Plans to do graduate studies in Biomedical Engineering -Wants to contribute to design of orthotics by making them more practical to use as well as making prosthetics more widespread using better material selection.	-Learn about current statistics of O & P education and use it in Latin America. -Learn about the different types of prosthetic devices and their design. -Learn about possible ways to improve their design. -Learn methods of mechanical testing of polymers -Learn about new technologies such as the QR code and help develop its use.	-Increase awareness of prosthetics treatment in Latin America. -Reach individuals who are interested in becoming local practitioners in their community and train them. -Supply funding and resources for communities in Latin America that are unable to start off their own facilities. -Make use of prosthetics more widespread.
Kuzel, Julia (PS)	-Strong writing and research skills -Background with hippotherapy -punctual	-Learn specifics about O&P -Practice working in a team -develop public speaking skills	-Work well as a group to make a difference in Bogotá -Learn to develop teaching materials
Luttinen, Alexandra (ME)	-Past IPRO experience -Ability for concise communication -Combining ideas into a universally acceptable solution -Microsoft Office Suite -OpenOffice.org Suite	-Further development of past IPRO -Try a new role in team (more of a supporting role than a leadership role)	-Be on time and productive with the time we have -Learn something new -Relate the choice and manufacture of orthotic and prosthetic devices to its mechanical background

Romo, Esther (PSYC)	- I speak Spanish - I understand the Latin America culture, - I had worked with low income Hispanic population (I have the ability to connect with them in trustful, meaningful way and that has increased the odds in their recuperation. This one of reason why I decided to study Psychology) -had worked with persons with disability (mental and physical) -I have a technical degree in Physical Therapy, from Mexico -I'm a Psychology major, with an interest in rehabilitation - I have a degree in Chemical Engineering	-I would like to gain experience in how to develop a multidisciplinary project -To gain experience of working in multiethnic group -To improve my verbal communications	- I expect to make a at least a tiny "dent" in the large problem that is health care in Latin America -To learn about QR technology, -I expect to work in a respectful environment that increases collaboration between disciplines.
Sarvana,Saad (ME/AE)	-Great communication and organization -Good leadership -Basic knowledge of AutoCAD -Some teaching experience	-Gain knowledge of O & P -Cost effective solutions -how to help others in need	-Learn a lot from this IPRO -Work well in my team as well as collaborate with other sub teams -Meet professionals and see the technology used in O & P field
Svirkova,Bozhidara (MBB)	-Experience in the field of Biology,Chemistry and Physics -Microsoft Office -Creative -Responsible worker -Exposure to doctor-patient relationship	-Presentational skills -Developing team building and communication -Self confidence -Better understanding of O&P and the field	-Contribution to the project -Create a educational program that will help the students to best prepare them in the field -Explore the new O&P technologies
Syvongsa, William (BME)	-Communication: Listening to others as well as conveying ideas to others as well. -Planning: Scheduling, focusing on a goal. -Helper: Strong desire to always assist others. -"Gopher": Going along with helping others, taking care of small tasks that just need to get done. -Student: Looking to learn and improve	-Latin America: How their economy and healthcare is run and how it affects our ability to help them. -Working on a project outside of the classroom environment -Allied healthcare: A different perspective on healthcare.	-To learn -To assist in something I feel is a good cause -To be effective in whatever project plan is developed -To see myself in this type of situation -To work with others in a different discipline

A.4 Communication

Working in subgroups will be essential for completing every part of the project in the allotted time but will also create a problem of communication between the three groups. To assure members of each group are aware of the work of the other groups, small presentations will be given by each group on Tuesdays. This will allow in class discussion about the progress, problems and needs of each groups topic. All files should be uploaded to iGroups. The group will used email as the primary mode of communication and the iGroups discussion board will be used for group conversation. Phones will be used when necessary for both texting and phone calls. Finally, subgroups are expected to meet outside of class when necessary for their work.

B. Team purpose and objectives

The objective of this semester's IPRO 309 will be to incorporate three seminars into the framework proposed by last year's IPRO 309. Fall 2010's IPRO 309 proposed an educational curriculum that helped train individuals in Orthotics and Prosthetics in Categories I, II, and III. The goal is to improve on last year's IPRO proposal and bring it closer to completion.

Although the awareness of medical advancements is central, the well-being of patients is also of equal importance. Compatibility of medical devices and their psychological impacts on patients need to be understood by people involved in orthotics and prosthetics. Also related to a better patient care, it is beneficial to create a feasible way of tracking patient information. To emphasize these, seminars will be introduced consisting of materials compatibility, patient well-being, and electronic medical record keeping. Material compatibility will explore aspects such as patient-device interaction and minimizing negative reactions due to the orthotic and prosthetic devices, which includes rashes or other sorts of discomfort. Patient well-being will evaluate the psychological impact of said devices on the patient and help them incorporate the devices into their daily lives. Electronic medical record keeping will introduce technology that will enable practitioners to gather and track the patient's medical records with ease. The main technology to explore for this course would be the Quick Response (QR) Technology that is incorporated in many smartphones today.

These seminars will help increase awareness that orthotics and prosthetics are not just medical fields, but instead a series of professional relationships with patients to help them endure the difficulties and pains they are going through. The goal is that medical professionals will be able to provide the best care possible to patients, both physically and mentally.

Additional improvements will also be made on the capstone design course, introduced in previous IPROs, by incorporating methods being used in capstone courses at the Illinois Institute of Technology.

C. Background

There are an estimated 2.5 million people in Latin America in need of orthotics and prosthetics (O & P) care and only fifty certified and 1500 uncertified O & P practitioners in that area (ISPO O & P statistics survey in Colombia). (Certification by the International Society for Orthotics and Prosthetics, ISPO). The Orthotics and Prosthetics Education in Latin America and the United States Interprofessional Project (IPRO 309) has always felt that the most effective way to rectify this discrepancy is through the education of more O & P personnel.

Spring of 2011 is the eleventh semester of this IPRO, and as such, there is a lot of material to reference and build on. Almost all of the past IPRO 309 teams have focused on creating educational models for orthotic and prosthetic technicians. The subjects for these modules have included non-surgical treatment of stroke, spinal trauma, and club foot patients; general treatment for common spine, upper, and lower limb ailments; and lower limb prosthetic devices for pediatric, adult, and geriatric patients. In addition, a few teams have been more concerned with the learning process and have focused on applying project based learning to O & P education. Finally, last semester's team created a cross category senior level capstone style course in which students in their last semester actually treat patients under professional supervision.

In addition to previous work, it is important to note the relevant information of each focus, patient well-being, materials selection, and medical record keeping.

Careful materials selection is critical to an effective orthosis or prosthesis. First and foremost the mechanical properties of the material must be considered, the material must be strong and flexible enough to perform its intended function. Not only do the strength and stiffness need to be properly accounted for, but patient comfort must also be considered. One area of patient comfort to be addressed is a possible allergic reaction. A patient can have allergies to any number of materials used in the fabrication process, anything from the lining material to the rivets should be chosen with a careful eye to patient allergies. Another important and some times over looked aspect of materials selection is the potential for rubbing on the skin. Materials with high coefficients of friction can cause blisters and lesions anywhere they come in contact with patient skin. This is an even more important consideration if the device may have an opportunity to slide slightly.

Patient well-being has many aspects with stigma being one of those aspects. Stigma is a set of negative attitudes and beliefs that motivate the general public to fear, reject, avoid and discriminate against people with any disability or mental illness. The stigma can show in a patient as a self-stigma or as a public stigma but, in either case the effects of it can be detrimental to the patient. In some cases the patient may experience what is called “double stigma” which is the combination of self and public stigma at the same time. It has been found that stigma inhibits people from seeking care while reducing patients’ access to resources, opportunities, self-esteem, provoking isolation, and hopelessness among patients. It also causes friends and neighbors to withdraw from the labeled individual and leads to societal discrimination and abuse. Stigma may be influenced by the diagnosis of some kinds of illness or disability. Health care providers can contribute to the stigma experienced by patients. One

source of stigma is the “careless use of diagnostic labels” by health care providers and others especially by stigmatizing against certain illnesses and diagnostic labels which may be harmful when they are not completely understood by patients, families, community members and policy makers. Health care providers at the different levels need to be aware of how their interactions with the patients can affect their treatment, recovery and the acceptance of the new prosthesis in our case.

We have a unique opportunity to create a model of service in which mental health and physical health can be addressed. The physical disabilities are clear but there are other components to the well being of the population that we intend to serve where a holistic model of health care can be implemented.

Finally, it is necessary to give O & P students a look into medical records keeping, focusing on patient privacy and up and coming technology. Currently, very few medical records are kept electronically, and those that are still are not kept synonymously throughout all of a patient's health care specialists. The natural progression of the health care system, then, seems to be to have one universal record for each patient, accessible and editable by the particular health care professional. This brings up two large potential issues, the first is that of privacy, and the second is that of accessibility. New technology is the easiest way to address accessibility, this IPRO particularly wants to focus on Quick Response (QR) Code. This code is a black and white square that contains specified information. Many people compare QR Code to a two dimensional Bar Code, in this comparison there is one major difference, though, and that is that a Bar Code must send the code to a server to retrieve the information, while QR Code contains all of the information within the pattern. In order to properly educate O & P students, we must look to the future to prepare them for as many potential changes in their field as possible.

II. Project Methodology and Structure

A. Methodology

This IPRO team will continue to expand on and evolve educational curricula for Categories I, II, and III O&P professions developed in the previous semesters. The curriculum that was developed in the previous semester has not yet reached a fully completed state. The focus of this IPRO will be to help expand on the current curriculum and bring it closer to a finished state.

First the IPRO will work on developing plans for a few short seminars that will help address current issues that may have been overlooked in the current curriculum. The issues that need to be addressed in these seminars will include the matter on material compatibility. IPRO 309 will research on the different types of material that are used to create orthotics and prosthetics. Perhaps a guest speaker can give a lecture on the biocompatibility of the materials. The purpose of these seminars will be to help the students being trained in categories I, II, and III. Although, this seminar may focus more on category III, it will allow categories I and II to understand the orthotics and prosthetic from an additional perspective. Orthotists and Prosthetists can make sure a patient who might have an allergy to certain

materials is not treated to such devices made of that material.

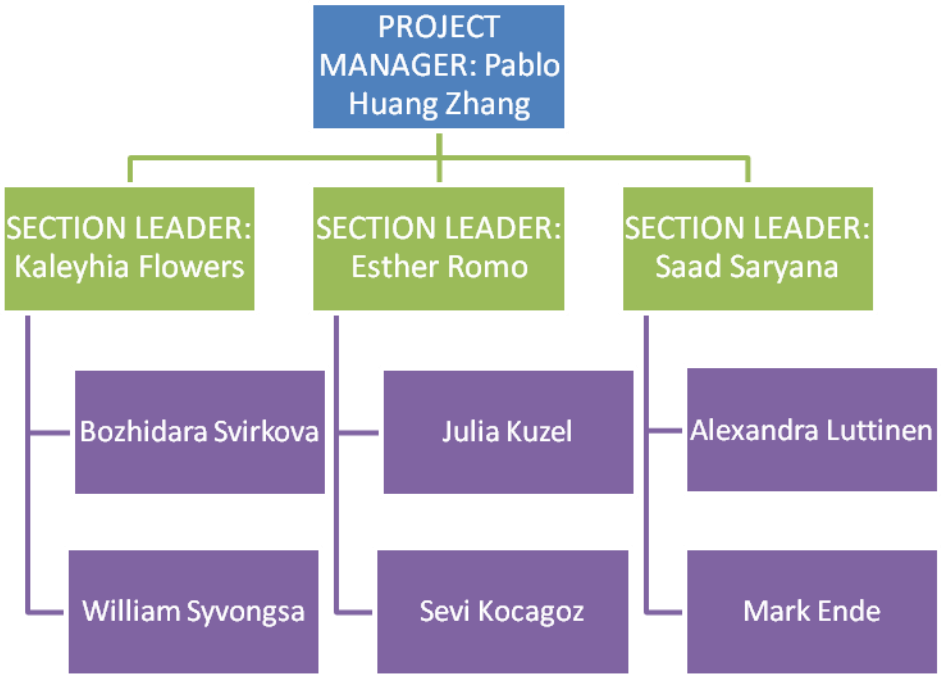
Second, the IPRO team will focus on patient well-being. By understanding how the patient is feeling the technicians can help to provide better care to the individual, and in some cases help convince the individual to continue using the orthotics and prosthetics. Educating patients on how to adjust to their orthotics and prosthetics is very in order for the patient to be comfortable and gradually get use to them. Patients that are given an orthotic or prosthetic can become frustrated and feel uncomfortable at first, but with a little knowledge of how to go about their daily lives will put them at ease.

Third, the IPRO will work on incorporating quick response (QR) technology into the orthotics and prosthetics. The aim of this will be to train categories I, II, and III to understand the process of keeping records of patients. Incorporating QR technology can have many important benefits. The QR technology can include a web address that the patients can use to obtain online help. The website can include pictures of how to properly wear the orthotics and prosthetics, answer frequently asked questions, or even allow orthotic and prosthetic patients to connect with one another. Furthermore, critical patient information can be stored in the QR code. This information can include everything from past treatments the patient has received, whether or not they routinely wear their device, or even adverse skin reactions do to the materials used in construction of the orthotic and prosthetic devices. The QR code may also include information about some of the patient's hobbies. The advantage of this is two-fold; it will allow the medical staff to talk to the patient about something they enjoy in the hopes of helping the patient relax, and also helps the staff in selecting the proper prosthetic for the patient.

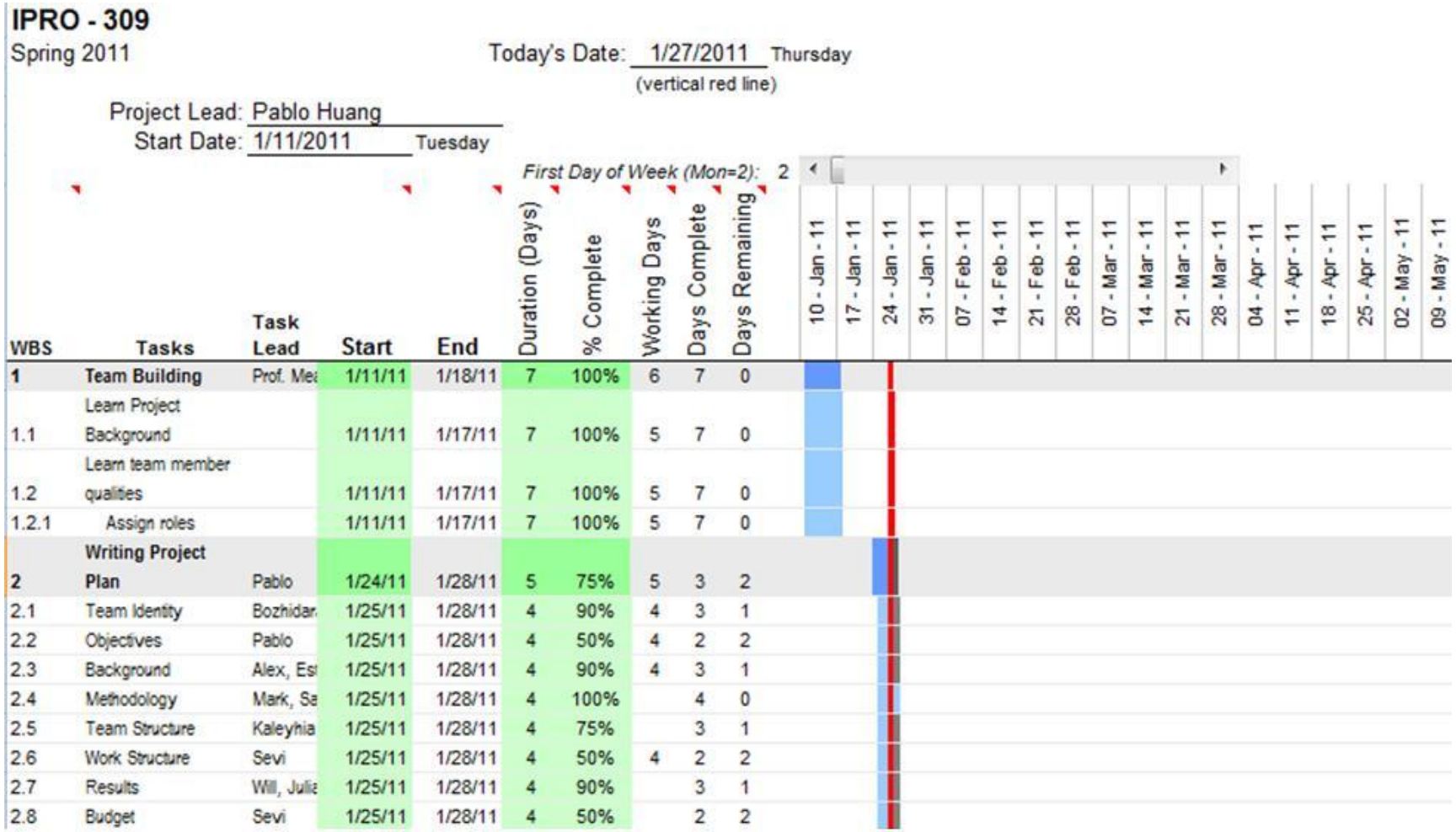
IPRO 309 will continue to help expand and alter the capstone design course that was developed to incorporate graduates from categories I, II, and III on a single project. In order to accomplish this, the team members will draw on their experiences in Illinois Institute of Technology's capstone design courses. By doing this, the team members can draw on what aspects worked well, and what aspects hindered progress in order to help modify the capstone course for the orthotics and prosthetics students. If successful, it will make the capstone course more rewarding, and improve the confidents of the students. The modified curriculum will be evaluated against the accreditation requirements outlined by both NCOPE (National Commission on Orthotics and Prosthetics Education) and ISPO (International Society of Prosthetics and Orthotics). Furthermore, the curriculum can be reviewed and critiqued by some of the individuals and organizations that the IPRO is working in conjuncture with. The sources of review may include BioConcepts, Joliet Junior College, Centro Don Bosco University (Bogotá, Colombia), and Children's Memorial Hospital. Modifications will then be made to the curriculum with these suggestions in mind.

B.1 Team structure

The IPRO 309 team will present effective methods of public awareness. The team will provide extensive deliverables, such as a project plan, an abstract, a mid-term presentation, and a final report. However, aside from these critical aspects, the IPRO team will be creating posters, PowerPoint presentations, visual aids to present data, and a website or blog. To further extend this IPRO's knowledge, educational modules and workshops will be designed for others to view. To ensure that deadlines are met, each sub-group will regularly provide details and report back to the entire team regarding their accomplishments, research, and progress. Information collected will be consolidated and collaborated with the Centro Don Bosco University (Bogotá, Colombia).



B.2 Gantt chart



IPRO - 309

Spring 2011

Today's Date: 1/27/2011 Thursday

(vertical red line)

Project Lead: Pablo Huang

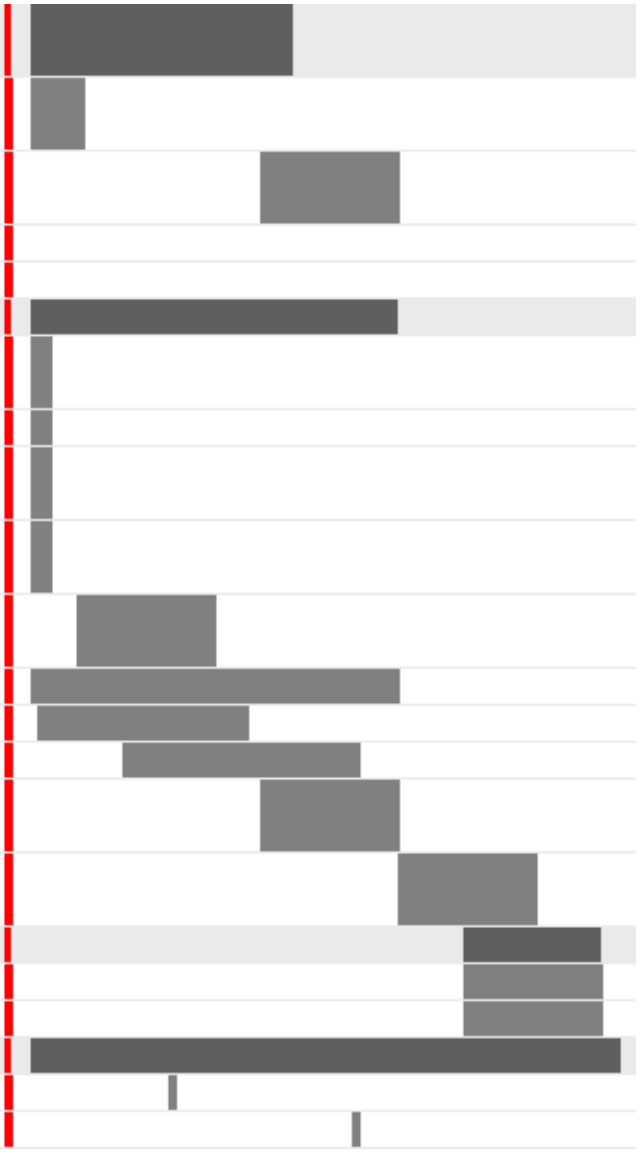
Start Date: 1/11/2011 Tuesday

First Day of Week (Mon=2): 2

WBS	Tasks	Task Lead	Start	End	Duration (Days)	% Complete	Working Days	Days Complete	Days Remaining
1	**Team Building**	Prof. Mea	1/11/11	1/18/11	7	100%	6	7	0
1.1	Learn Project Background		1/11/11	1/17/11	7	100%	5	7	0
1.2	Learn team member qualities		1/11/11	1/17/11	7	100%	5	7	0
1.2.1	Assign roles		1/11/11	1/17/11	7	100%	5	7	0
2	**Writing Project Plan**	Pablo	1/24/11	1/28/11	5	75%	5	3	2
2.1	Team Identity	Bozhidar	1/25/11	1/28/11	4	90%	4	3	1
2.2	Objectives	Pablo	1/25/11	1/28/11	4	50%	4	2	2
2.3	Background	Alex, Est	1/25/11	1/28/11	4	90%	4	3	1
2.4	Methodology	Mark, Sa	1/25/11	1/28/11	4	100%		4	0
2.5	Team Structure	Kaleyhia	1/25/11	1/28/11	4	75%		3	1
2.6	Work Structure	Sevi	1/25/11	1/28/11	4	50%	4	2	2
2.7	Results	Will, Julia	1/25/11	1/28/11	4	90%		3	1
2.8	Budget	Sevi	1/25/11	1/28/11	4	50%		2	2

10 - Jan - 11 | 17 - Jan - 11 | 24 - Jan - 11 | 31 - Jan - 11 | 07 - Feb - 11 | 14 - Feb - 11 | 21 - Feb - 11 | 28 - Feb - 11 | 07 - Mar - 11 | 14 - Mar - 11 | 21 - Mar - 11 | 28 - Mar - 11 | 04 - Apr - 11 | 11 - Apr - 11 | 18 - Apr - 11 | 25 - Apr - 11 | 02 - May - 11 | 09 - May - 11

3	**Review Fall 2010 Curriculum**	1/31/11	3/11/11	40	0%	30	0	40
3.1	Going over last semester materials	1/31/11	2/07/11	8	0%	6	0	8
3.2	Decide whether to incorporate seminars	3/07/11	3/27/11	21	0%	15	0	21
3.3	Sub Task level 2	1/26/09	1/31/09	6	50%	5	3	3
3.4	Sub Task level 2	2/02/09	2/07/09	6	50%	5	3	3
4	**Seminars**	1/31/11	3/27/11	56	0%	40	0	56
4.1	Determine Seminar Groups	1/31/11	2/02/11	3	0%	3	0	3
4.1.1	QR Technology	1/31/11	2/02/11	3	0%	3	0	3
4.1.2	Psychology/Social Work	1/31/11	2/02/11	3	0%	3	0	3
4.1.3	Materials Checklist	1/31/11	2/02/11	3	0%	3	0	3
4.2	Detemine Seminar Format	2/07/11	2/27/11	21	0%	15	0	21
4.3	Preparation	1/31/11	3/27/11	56				
4.3.1	Research	2/01/11	3/04/11	32	0%	24	0	32
4.3.2	Prepare Lecture	2/14/11	3/21/11	36	0%	26	0	36
4.3.3	Prepare Presentation	3/07/11	3/27/11	21	0%	15	0	21
4.4	Presentation of Seminars	3/28/11	4/17/11	21				
5	**IPRO Day**	4/07/11	4/27/11	21	0%	15	0	21
5.1	Assign tasks	4/07/11	4/27/11	21	0%	15	0	21
5.2	Prepare Stand	4/07/11	4/27/11	21	0%	15	0	21
6	**Field Trips**	1/31/11	4/30/11	90	0%	65	0	90
6.1	Trip 1	2/21/11	2/21/11	1	0%	1	0	1
6.2	Trip 2	3/21/11	3/21/11	1	0%	1	0	1



B.3 **Designation of roles**

Project Manager (Pablo) - The Project Manager is responsible for the coordination of all parts of the project. They should be in regular contact with the Subgroup Leaders and have the overall goals of the project in mind. They will make sure all Subgroups are contributing to the completion of the project in a consistent way.

Minute Taker (Alex) - Records the discussion during any meetings, paying special attention to the following: decisions made, tasks that require work outside of class for completion, and timelines for all applicable notes.

Agenda Maker (Julia) - Creates an agenda for each meeting to provide structure to the class meetings. Agendas should be emailed to the class by 10pm on the day before any class meeting to allow for idea preparation.

iGroups Moderator (Mark) - Is responsible for organizing the team's iGroups account and updating it regularly. They should make sure the Agenda Maker posts the current agenda and the Minute Taker posts meeting minutes in a timely manner.

Subgroup Leaders (Kaleyhia, Esther, & Saad) - The team will consist of three subgroups corresponding to the three ISPO Categories. Each subgroup will have a leader. Each of these leaders will be responsible for coordinating the work of their subgroup as it relates to the requirements of their category and the curriculum for Category I.

Field Trip Coordinator (Sevi) - The Field Trip Coordinator will be responsible for the organization of all field trips. This includes transportation, dates and times, locations, and educational value. They are expected to give no less than two weeks notice for a field trip to the team.

External Affairs Coordinator (William) - The External Affairs is responsible for all communications with outside institutions about the development of this curriculum or about its eventual implementation. The External Affairs Coordinator also will coordinate IPRO Day and Mid-Term Reports.

Web Designer (Bozhidara) - The Web Designer is responsible for the creation and effective use of a website. They should determine, with the input of the team, whether or not a separate website is an effective tool. From there, she will decide on the appropriate content, organizational scheme, and how to present the material in a simple yet attractive way.

C. Expected results

To complete the project, a large portion of time will be spent on research. To properly develop mini-seminars to incorporate in the course designed last semester, research will have to focus on the content of the class and how to effectively communicate a large amount of information in a short amount of time. From the research, content will be developed. Content may include worksheets, reading material, diagrams and hands on activities. Presentations will convey ideas throughout the project and will be essential to the mini-seminars. Material compatibility research will produce educational materials focused on the physical compatibility of the orthotics and prosthetics which may include recognition of rashes caused by metals or discomfort caused by and ill fitting device. The educational materials will also include compatibility with individual patient's daily activities. The patient well-being educational materials will include information on the barriers patients will face in their daily lives and how to help patients overcome these challenges. Medical record keeping technology will focus on QR (quick response) coding, giving students experience with the use and benefits of using QR coding for more efficient medical record keeping. Though QR coding is already easily accessible, some challenges still exist because the technology relies on the use of a smart phone. Because even mini-seminars take a large amount of time to develop, the limited number of weeks in the semester will make completion difficult. The mini-seminars will allow an addition of important information to the capstone course and possibly expanding similar courses to other fields of medicine.

D. Project Budget

Budget ($4,000)
Total used: approx $2,250

Research ($1050)
Material to prepare the seminars and/or improve Fall 2010 curriculum
Resources:

- books ($400)
- materials for prototypes ($300)
- software ($200)
- technological devices for building prototypes/tools ($150)

Deliverables ($500)
Materials used for the final product

- printing ($150)
- posters ($50)
- misc. materials ($300)

Field Trips ($500)
Group trips to locations in Chicago to gain more experience in the field of Orthotics and Prosthetics.

- Transportation ($500)

Guest Speakers ($0-$200)
Invitation of a speaker experienced in the field of O&P.