TECHNOLOGY ENTREPRENEURSHIP PROGRAM (TEP)

A joint initiative of Indian School of Business and
AP Society of Knowledge Networks

Annexure A: Framework

Context

The economy of India, which many hoped would be the engine of future global growth, has slowed down in the last few years. The country's growth, which reached a high of 10.1 percent in 2010, dropped to less than 5 percent in 2012-13.

India has the potential to be a global technology leader. Indian industry is competing globally in software and even in areas such as automobiles, chemicals and engineering equipment. A critical issue for the future success of Indian industry is the growth of technical/engineering education in India. Education needs have to address the development of technical and functional skills required to generate an entrepreneurial mindset and to prepare future engineers for solving more complex, interlinked and fast-changing problems.

The benefits of technology entrepreneurship education are not limited to the creation of new business ventures and subsequent new jobs but will develop key competencies of students, develop their mindsets and in turn enable them to be more creative and self-confident in whatever they undertake.

The process of embedding technology entrepreneurship education will require fundamental organisational and cultural change complemented by the use of new cross-Institutional and multi-disciplinary pedagogical methodologies. This process will require re-orientation of traditional models and the development of new staff skills and competencies and the active involvement of industry and entrepreneurs.

To this end, Indian School of Business has joined hands with AP Society for Knowledge Networks to pilot the Technology Entrepreneurship Program (TEP). Through this initiative, ISB aims to embed the technology entrepreneurship education across all disciplines of engineering to create a successful technology entrepreneurial graduate.

It is in this collaborative effort and journey of the school to help reshape the socioeconomic landscape of India through technology, innovation and entrepreneurship that we at ISB welcome the active participation of committed and synergistic institutions and individuals.

Objective

Indian School of Business has joined hands with AP Society for Knowledge Networks to pilot the Technology Entrepreneurship Program (TEP). Through this initiative, ISB aims to embed management training, and more specifically technology entrepreneurship education, across the major disciplines of engineering.

This program has two goals: first, and foremost, it shall help the students develop several key competencies, offer a broad management education, and enable them to be more innovative and self-confident in whatever careers they choose to undertake. Second, it shall offer mentoring and other support to help the student's efforts to create and launch new business ventures.

Outcomes

TEP shall help a smaller set of interested entrepreneurial students enrolled in the program to start new ventures, and perhaps more importantly, also enable every enrolled student to learn both the soft and hard skills to become valuable and productive employees for both large and small enterprises. Expected outcomes are

- Improved academic performance and educational attainment
- Increased problem-solving and decision-making abilities
- Improved interpersonal relationships, teamwork and self-esteem
- Job readiness - enhanced employability
- 2-5 % of the enrolled students starting their own ventures

Curriculum Overview

The curriculum, designed by ISB, is intended to complement the technical training the target (engineering and sciences) undergraduate population receives from their respective home institutions. ISB shall also strive to continuously innovate and improve the curriculum with the goal of furthering the student's career goals in entrepreneurship, management, product/service

design, and other related areas. There are three main components of the program are:

a. "Product and Service Design 101", "General Management and Entrepreneurship", and a specialized course titled "Entrepreneurship". Lab activities and exercises (as part of the online courses) to synthesize the theoretical learning.

b. A hands-on "Design Challenge" that student teams will participate in.

c. Workshops and mentoring for students pursuing own ventures.

In additional to the academic content above, ISB shall also organize an "Introduction to TEP" kick-off session by having:

i. live-streamed panel discussion with engineers and young entrepreneurs who are in the early stages of developing their ventures, and

ii. Recorded video keynotes by eminent academics working in the field of technology entrepreneurship and innovation.
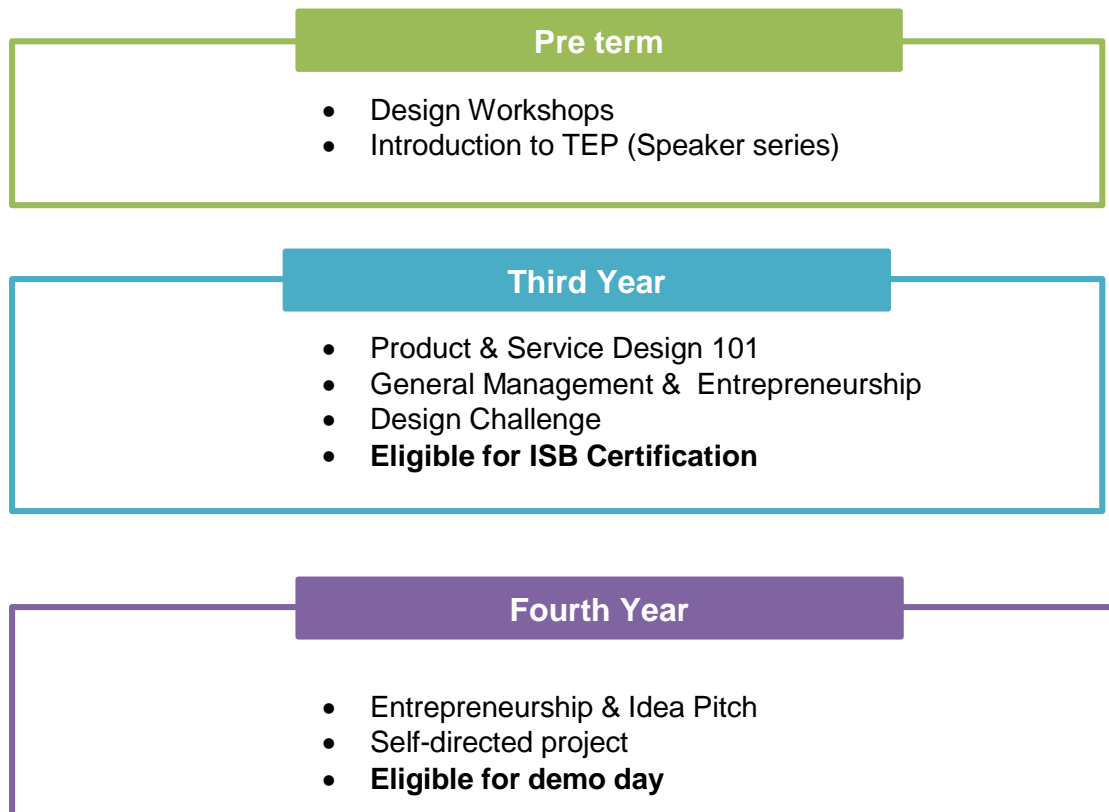
Figure 1 below shows the sequence of courses and activities that a participant in the program shall be expected to complete. The full TEP sequence is designed to run approximately 24 months. The first part of the online modules designed for 3rd year ("Product and Service Design 101") shall teach product development fundamentals, design thinking and develop an understanding of general management concepts and tools. These shall serve as the foundation for the students when working on the design challenges (in the 2nd semester of TEP program), and later in their self-directed design projects (in the 4th semester of TEP program).

The second part of the online modules designed for 3rd year shall be focused on developing soft skills, and especially topics in entrepreneurship. While engineering education excels in developing strong *analytical* skills among the students, to be a designer who can deliver technology products (or services) needs a student to also understand the business side of innovation, and to *synthesize* their technical knowledge with business understanding to be successful in the industry. Hence, it is expected that these skill-sets will possibly enhance the employability of engineering students graduating from the program, and will also set up the students with sound business foundations required to develop successful ventures (if they chose to do so later on).

A final online course titled "Entrepreneurship" shall be offered in the 4th year. This course shall primarily focus on soft skills, and shall aim to help the students working on self-directed

innovation projects come up with compelling and successful business plans. Finally, the second part of 4th year shall be devoted to mentoring a subset of students who are interested in starting new ventures intense mentoring and on-site workshops at ISB to help them realize their entrepreneurship goals.

Figure 1: Sequence & Flow of the TEP

Pre term
- Design Workshops
- Introduction to TEP (Speaker series)

Third Year
- Product & Service Design 101
- General Management & Entrepreneurship
- Design Challenge
- **Eligible for ISB Certification**

Fourth Year
- Entrepreneurship & Idea Pitch
- Self-directed project
- **Eligible for demo day**

Expectations from Participants, Assessments & ISB Certification

The part of the program that is delivered online shall be organized into modules, with each module focusing on one or two related topics. Each of the three courses shall be organized into 10-12 modules, and each module is expected to have 1 to 2 hours of video content. In addition, each of the modules shall also include a Q&A session, which shall be primarily conducted through the online platform, where students shall ask questions and clarifications about the module.

This Q&A session conducted through the online platform shall be designed for peer-based learning where the participants shall be expected not just to pose questions, but to also engage in moderated discussions with other participants. The assigned faculty (or a teaching assistant, depending on the module) shall also participate in answering questions and moderating this online forum, and might choose to post additional video content to address commonly asked questions/clarifications. The students are expected to be active participants in the online Q&A forum, and the work-load commitment for this activity is expected to be between 1-2 hours. In addition to watching the video content and participating in the online Q&A forums, the students shall be expected to put in an additional 1 to 3 hours of outside class work (including readings, exercises, etc.).

The students shall be evaluated at the end of each module by means of an online quiz and by assessing their participation in the online Q&A forum. To qualify for a certificate of completion from ISB, the student needs to demonstrate his/her competency in the course material and obtain passing scores (60%) in the assessments attached to the modules. It is expected that the assessment phase for each module would require about 1 hour of the student's time.

The total time commitment from the student for each module (video lectures + readings/ exercises + Q&A forum + online-assessment) is expected to be about 4 to 8 hours. Since ISB intends to run each course over a period of 4 months (16 weeks), it is expected that the students would need to put in 3-6 hours of work per week in addition consuming no more than 1 hour of video content per week.

The above outline is meant to offer a guideline to the organization of each module. While there is likely to be some variability, and depending on the content, some part of the structure may be immaterial for some modules, ISB shall attempt to offer modules that, to the extent possible, are consistent with the structure outlined above.

Curriculum & Content

Pre Term

3rd Semester	Winter Break	4th Semester	Summer Break
		Design Workshops	
		Introduction to TEP – Speaker Series	

"Introduction to TEP" which serves to kick-start the program, shall consist of 4 modules– one which includes a panel discussion with early stage start-up founders that also serves to introduce the TEP program, and remaining 3 online modules (organized as keynote addresses) on different key topic areas of design thinking and product/service development listed below

a. Customer Needs Assessment: topics might include qualitative tools (such as field work or ethnography), and quantitative tools such as conjoint analysis, voice of customer techniques.
b. Fuzzy front-end of design: topics might include theories of creativity, brain-storming, Idea generation, Concept selection, fast prototyping, experimentation.
c. Industrial design process: topics might include product architecture and design, detailed system design, integration, functionality and aesthetics, design for manufacturing.

Third Year

5th Semester	Winter Break	6th Semester	Summer Break
Product and Service Design 101		General Management & Entrepreneurship	
		Design Challenge & ISB certification	

At the beginning of 3rd year (5th semester), ISB shall offer "**Product and Service Design 101**". ISB does not require the students enrolled in this course to have completed any specific pre-requisite other than a basic undergraduate course in calculus. These modules may include:

1. Introduction to Design Thinking
2. Process models of development, stage-gates, basic ideas about NPD process
3. Creativity and Brainstorming for Design
4. Tools for Service Design: Mapping the customer Journey
5. Tools for Innovation: Conjoint analysis + voice of customer methods
6. Usability, aesthetics, functionality
7. Product architecture and Modularity
8. Products and Product Suites
9. DfX- Design for manufacturing, re-manufacturing, sustainability
10. System & Engineering Design, prototyping, experimentation

11. Live Design (Hands-on lab activity to bring together prior learning)

Middle of 3rd year (winter break of the 3rd year) is when the students will be divided up based on their undergraduate majors into teams of 4-5 people, and will be assigned **design challenges**. These design challenges shall be chosen by the ISB faculty (with the advice of the partner schools and the industry council). The students will be expected to work closely with academic mentors from their subject areas from their respective home institutions, and shall complete the design challenges by the end of their 6th semester. With the support of the nodal colleges, ISB shall select the top 3 teams/challenge. These teams shall receive special prizes and appreciation from the industry.

Running parallel to the design challenge outlined above, ISB shall offer a course titled "**General Management & Entrepreneurship**." ISB requires the students enrolled in this course to have completed the design challenge, and the "Product and Service Design 101" course, and to have obtained a passing grade. The modules included in "General Management & Entrepreneurship" may include:

1. Innovation tournaments – screening, selection
2. Project management
3. Design Tools – Design Structure Matrix
4. Risk management, tools, techniques
5. Forecasting for new products
6. Product/Technology Adoption/Diffusion
7. Sustainability
8. Pricing Models
9. Frugal innovation
10. Manufacturing and Quality Management

At the end of 3rd year, the students have the opportunity to exit the program. Those students who have successfully completed the two courses ("Product and Service Design 101", and "General management & entrepreneurship") will be certified by ISB.

Fourth Year

7th Semester	Winter Break	8th Semester	Summer Break
Entrepreneurship		Self-directed project	
Idea Pitch		Demo day	

ISB shall offer those students who choose to remain for their 4th year a final set of specialized modules titled "**Entrepreneurship**." The modules may include:

1. Screening and the pitch
2. Screening analysis
3. Financials
4. Intellectual property and legal issues in innovation
5. Venture financing
6. Industry and competition analysis
7. Market analysis & positioning
8. Choosing the start-up team

In addition to the above course-work, the students who opt to continue on for the 4th year shall be expected to form teams and undertake a **self-directed own product/service design project** using the tools and concepts that they learned in the previous years. The subject area experts from the student's home institution, with the help of industry mentors, shall be expected to advise these student teams. During the winter break or just before the end of the 7th semester, these student teams shall present their business plans/designs during the idea pitch day at the student's home institution. ISB faculty (in collaboration with subject area experts from other engineering schools) shall select up to 10 teams out of the shortlisted ideas for the final leg of the program.

These selected teams shall be given the opportunity to continue onto an intensive workshop and boot-camp at ISB campus to help the students get jump started on their business ideas. In addition to the workshop, ISB shall also coordinate and assign industry and academic mentors for these students who shall assist the student teams to work further on their business idea during their final 8th semester.

At the end of the 8th semester, the student teams shall show-case their product/service offering during a final demo day to the investors, mentors and the incubators to be conducted

at ISB. Depending on the stage and the nature of the venture, the students can choose to pitch for funding or a specific incubator of their choice. The AP society for knowledge networks will provide seed funding of upto INR 25 lakhs per team based on the recommendations of ISB.

Role of External Engineering Faculty from Partner Schools

Since some of the partner schools might wish to offer the courses offered by TEP for letter grade, ISB shall also offer a separate online quiz that these schools might choose to use as a final exam. This final exam shall be assigned to the students based only on the discretion of the students' home institution. Thus, from the perspective of obtaining the certificate of completion from ISB, the final exam shall be purely optional. It is expected that the engineering faculty from the student's home institution shall offer significant support at three points in the program.

First, one of the modules listed above ("Live Design") shall involve a lab activity where the students engage in a design exercise that aims to help the students synthesize and assimilate the learning from prior modules. ISB faculty shall offer a short introduction video to the activity, and shall develop course materials (include teaching notes) to help the engineering faculty conduct this hands-on design exercise in their home institution. It is expected that organizing this activity for the students would involve 4 hours (2 hour of activity, and 2 hour of preparation time) for the engineering faculty at the partner schools. The associated ISB faculty shall also prepare a video debrief (0.5 to 1 hour long) for the design exercise.

Second, during the design challenge phase, it is expected that the engineering faculty from the student's home institution shall offer significant support to the student teams. Moreover, this support is expected to involve about 1 hour work from the engineering faculty per team every two weeks, for a total of not less than 12 weeks. Thus, it is expected that the work commitment from an engineering faculty shall be about 6-8 hours of meetings and advisory work for each team that the faculty shall be mentoring.

Third, the subject area experts from the student's home institution shall be expected to mentor and advise those student teams who choose to a self-directed own product/service design project (in their 7th semester). It is expected that this advisory role would involve about 1 hour work from the engineering faculty per team every two weeks, for a total of not less than 16

weeks. Thus, it is expected that the work commitment from the engineering faculty shall be about 8 hours of meetings and advisory work for each team that a faculty shall be mentoring in their self-directed project.