Graduate School of Technology and Innovation Management

☐ Graduate School of Technology and Innovation Management

The Graduate School of Technology and Innovation Management is designed to educate future technology and innovation leaders in the corporate and public sectors. The primary tracks include [1] Industrial Innovation which offers courses on process and product innovations and the application of big data and IT in manufacturing industries, [2] Technological Entrepreneurship which provides a balanced set of theory and practice courses on technology commercialization and venture businesses, and [3] Strategic Technology Management which highlights an interdisciplinary problem-solving approach in a wide range of courses on complex technological and innovation decision problems.

☐ Credit Requirement

Program	Total Credits	Course Credit	Research credit
Master's	at least 48 credits	at least 48 credits	-
Doctoral	at least 72 credits	at least 39 credits	at least 33 credits

☐ Curriculum

Course is	Course No.	Course Title(ENG)	Course Title(KOR)	C-L-E	Remark
Common Required (Master : Choose 8)	TIM501	Management of Technological Innovation	기술혁신경영론	3-3-0	
	TIM502	Managing People at Work	조직행동론	3-3-0	
	TIM503	Data Mining	데이터 마이닝	3-3-0	
	TIM504	Marketing	마케팅	3-3-0	
	TIM505	Principles of Finance & Accounting	재무와 회계원론	3-3-0	
	TIM506	Strategy	전략경영	3-3-0	
	TIM507	Management Communications	경영 커뮤니케이션	3-3-0	
	TIM508	Seminar on Industry and Emerging Technology Trends	산업 및 첨단기술 세미나	3-3-0	
	TIM509	Operations Management	운영관리	3-3-0	
Master Required (Choose 2)	TIM691	Industry Internship	산업 인턴십	-	
	TIM692	Global Study Mission	글로벌 스터디미션	-	
	TIM693	Global Consulting Internship	글로벌 컨설팅 인턴십	-	
	TIM694	Capstone Project	캡스톤 프로젝트	3-0-6	
	TIM695	Technology, Innovation Management Consulting Project	기술혁신경영컨설팅 프로젝트	3-1-4	

Doctoral Required Research Methodology (Choose 6)	TIM710	Research Methodology	연구방법론	3-3-0	
	TIM711	Research Methodology for Technology Management	기술경영 연구방법론	3-3-0	
	TIM712	Technology commercialization and Entrepreneurship Seminar	기술사업화 및 창업 이론 세미나	3-3-0	
	TIM713	Industrial Innovation Seminar	산업혁신 이론 세미나	3-3-0	
	TIM714	Technology and Innovation Management Theory Seminar	기술경영 이론 세미나	3-3-0	
	TIM715	Strategy Theory	경영전략이론 세미나	3-3-0	
	TIM716	Advanced Microeconomics	고급미시경제학	3-3-0	
	TIM717	Advanced Econometrics	고급계량경제학	3-3-0	
	TIM718	Corporate Finance Theory	기업재무 이론 세미나	3-3-0	
	TIM891	Independent Study	개별연구	3-3-0	
Doctoral Required	TIM890	Thesis Research	논문연구	Value of Credit	
Elective	TIM610	Advanced Analytics for Process Innovation	비즈니스 프로세스 최적화	3-3-0	산업혁신트랙
	TIM611	Big Data and New Product Development	빅데이터와 신제품 개발	3-3-0	"
	TIM612	Statistical Analysis for Managers	관리자를 위한 통계분석	3-3-0	"
	TIM613	Business Model Innovation: Servitization of Manufacturing	비즈니스 모형 혁신: 제조업의 서비스화	3-3-0	"
	TIM614	Integration of IT, Manufacturing, and Operational Systems	IT, 제조, 운영시스템의 통합	3-3-0	"
	TIM615	Reverse Design and Rapid Prototyping	신속한 시제품 제작 기술	3-3-0	"
	TIM621	Experiential Entrepreneurship & Tech Commercialization	기업가 정신과 기술사업화	3-3-0	기술창업트랙
	TIM622	Entrepreneurial Finance	벤처 재무	3-3-0	"
	TIM623	Entrepreneurial Sales & Marketing	벤처 마케팅	3-3-0	"
	TIM624	Growth Strategies for New Ventures	신생벤처기업의 성장전략	3-3-0	
	TIM625	Operations for Entrepreneurs	벤처기업의 운영전략	3-3-0	"
	TIM626	Pursuing Entrepreneurship within Existing Firms	사내 기업가 정신	3-3-0	"
	TIM631	Leading Innovation and Change	혁신과 변화의 리더십	3-3-0	전략적기술경영 트랙
	TIM632	Technology Value and Evaluation	기술가치 평가	3-3-0	"

Course is	Course No.	Course Title	Course Title	C-L-E	Remark
Elective	TIM633	Law and Intellectual Property Management	법과 지적재산권 관리	3-3-0	"
	TIM634	Disruptive/Radical Innovation and Practice	불연속 혁신과 실제	3-3-0	"
	TIM635	Technology Roadmapping for Strategy & Innovation	전략과 혁신을 위한 기술 로드맵핑	3-3-0	"
	TIM636	Regional Innovation Systems and Technology Policy	지역혁신 시스템과 기술정책	3-3-0	"
	TIM637	Open Innovation and Technology Acquisition Strategy	개방혁신과 기술획득 전략	3-3-0	"
	TIM638	Product Design and Development	제품 설계 및 개발	3-3-0	"
	TIM639	Project Management	프로젝트 관리	3-3-0	"
	TIM640	Business Models for High-Tech Products	하이테크 제품을 위한 비즈니스 모델	3-3-0	"
	TIM641	Manufacturing Systems and Supply Chain Design	제조 시스템과 공급망 설계	3-3-0	"
	TIM642	Knowledge Management and Innovation	지식경영과 혁신	3-3-0	"
	TIM643	Global R&D Management	글로벌 연구개발 관리	3-3-0	"
	TIM644	Negotiation and Deal-Making in Technology Industries	기술 산업에서의 협상과 거래	3-3-0	"
	TIM645	Managerial Economics	관리경제학	3-3-0	"
	TIM646	Technology Licensing Management	기술라이센싱 경영론	3-3-0	"
	TIM651	Special Topics in TIM I	Special Topics in TIM I	1-1-0	
	TIM652	Special Topics in TIM II	Special Topics in TIM II	2-2-0	
	TIM653	Special Topics in TIM III	Special Topics in TIM III	3-3-0	
	CDE511	Intergrated Design Project I	통합디자인프로젝트 I	3-2-2	
	CDE512	Ideation to Visualization	아이디어 시각화	3-2-2	
	CDE513	CAD for Design Engineering	디자인공학 CAD	3-2-2	
	CDE514	Engineering Technologies for Designers	디자이너를 위한 공학기술	3-2-2	
	CED515	Mechanical Elements & Design	기계요소 및 디자인	3-2-2	
	DHE581	Advanced Additive Manufacturing	고등적층제조	3-3-0	
	DHE572	Product Lifecycle Management	PLM	3-3-0	

☐ Description

TIM501 Management of Technological Innovation [기술혁신경영론]

Throughout this course, students learn how firms create and acquire value from innovative products and services. In particular, this course covers topics such as existing companies'management of innovative products and services, technology protection, commercialization processes, plans to acquire value from technological innovation, managing technological changes competition in high tech industries, technology evolution, and IP issues in technology management.

TIM 502 Managing People at Work [조직행동론]

Students will learn theories and concepts to understand people, groups, and organizations in enterprises, as well as practical tools to achieve the goals of individuals, groups, and organizations. Related topics include motivation, human resource management, decision making, organizational culture and change, organizational conflict, individual characteristics, and emotions.

TIM 503 Data Mining [데이터 마이닝]

Data mining is the process of discovering new patterns from large data sets involving methods at the intersection of artificial intelligence, machine learning, statistics, and database systems. Basic data mining techniques and their use in a business context will be addressed. Furthermore, an advanced topic in data mining (i.e. process mining) will also be introduced.

TIM 504 Marketing [마케팅]

This course deals with the subjects needed to design and execute the best marketing effort required to perform a successful strategy in target markets. Students will learn concepts and analytical tools needed for major marketing decisions through lectures, case discussions, case analysis, and presentation.

TIM 505 Principles of Finance & Accounting [재무와 회계원론]

This is a joint course in financial management and accounting. It focuses on the basic concepts and useful methodology to understand the essential knowledge of finance and accounting.

TIM 506 Strategy [전략경영]
This course is designed to address the theoretical and analytical tools relevant to the formulation and implementation of business/corporate strategy. Subjects covered in this course are: external/internal environment analysis, business strategy, corporate strategy, strategic processes, strategy execution, and competition in the high-tech industry. This course will utilize a variety of teaching methods that will help students to understand the practical application of strategic concepts.

TIM 507 Management Communications [경영 커뮤니케이션]

Communication plays a very important role in conceptualizing technological innovation in project teams as well as in developing businesses with stakeholders. Students will enhance their communication skills as they learn relevant communication theories and cases and participate in practice.

TIM 508 Seminar on Industry and Emerging Technology Trends [산업 및 첨단기술 세미나]

The latest information on industry, emerging trends in high-tech, and foreign companies' new technology development are discussed in this seminar presented by industry leaders and technology experts.

TIM 509 Operations Management [운영관리]

This course deals with ways to design and manage core manufacturing and service activities for a firm. Students learn the latest topics such as how to manage sourcing in a global environment and other major topics in management such as the movement of goods among suppliers, factories, and customers, production schedules, productive capacity adjustment, outsourcing/off-shore timing, and network management.

TIM 610 Advanced Analytics for Process Innovation [비지니스 프로세스 최적화]

In this course, students will learn how to visualize business processes inside and outside of the company, how to implement and control people and systems that are related to the performance of the task, and techniques to implement management systems that can efficiently manage and optimize the entire business. Real company cases will be analyzed by using Business Process Management Notation.

TIM 611 Big Data and New Product Development [빅데이터와 신제품 개발]

This course focuses on new product development using consumer and industrial big data. In particular, it deals with real-life domestic and international practices, including utilization of big data in the new product design, obtaining

useful information about consumers from big data, and the improvement of existing products using big data.

TIM 612 Statistical Analysis for Managers [관리자를 위한 통계분석]

Analytical decision-making techniques using statistics and optimization models are the main topics of this course. It deals with the approach to statistically analyze business situations. Students will be able to use and analyze data in the fields of marketing, operations management, finance, and more.

TIM 613 Business Model Innovation: Servitization of Manufacturing [비지니스 모형 혁신: 제조업의 서비스화]

Manufacturing enterprises in a high-cost economic environment should innovate constantly in order to survive. Students learn how manufacturing companies manage innovative services that complement products. Various methods, including service, support, financial services, consulting services, design/development services, and installation services, will be discussed in the course. In addition, topics related to carrying out an innovative service such as the cost-benefit analysis of the service and ways of overcoming organizational change will be covered.

TIM 614 Integration of IT, Manufacturing, and Operational Systems [IT, 제조, 운영시스템의 통합]

This course focuses on basic concepts, applications, and domestic/international cases on internet of things and cyber physical production systems that are the basic idea of smart manufacturing. This course introduces the main structure and integration methods of vertical integration and also the structure, methods, and application of horizontal integration.

TIM 615 Reverse Design and Rapid Prototyping [신속한 시제품 제작 기술]

Students learn the process of rapidly creating a prototype. For this purpose, classes will be conducted in the laboratory, and the techniques of the production of various parts and design, and know-how will be shared. Specifically, 3D printing, laser cutting, water jet cutting, CNC milling, CNC turning, thermoforming, silicone molding, and CNC routers will be used.

TIM 621 Experiential Entrepreneurship & Tech Commercialization [기업가 정신과 기술사업화]

This course is to experience technology commercialization and develop the ability to discover and obtain business value from technologies. Students from diverse backgrounds, such as natural science, engineering, management, humanities, will work on projects in groups.

TIM 622 Entrepreneurial Finance [벤처 재무]

This course focuses on the financial problems of start-ups and ventures, and will discuss pros and cons of the various financial options available to these companies. In particular, bootstrapping, crowdfunding, government grants and loans, commercial banks, angel investing, DPOs, venture capital, venture banking, and small IPOs will be discussed.

TIM 623 Entrepreneurial Sales & Marketing [벤처 마케팅]

Students learn about key entrepreneurial marketing concepts and methods and discuss their real world applications in entrepreneurship. It begins with students picking an entrepreneurial venture for which to develop an operational marketing plan.

TIM 624 Growth Strategies for New Ventures [신생벤처기업의 성장전략]

This course focuses on the problems that new venture companies face during their growth stages. Topics will cover company life cycle, growth theories, growth strategy, the role of management, organizational structure, business model innovation, franchise growth strategy, and marketing and finance strategy for growth.

TIM 625 Operations for Entrepreneurs [벤처기업의 운영전략]

This course will analyze specific problems that resource constraint ventures face in building operational strategies and systems.

TIM 626 Pursuing Entrepreneurship within Existing Firms [사내 기업가 정신]

The object of this course is to understand the process of generating a new line of businesses and products in the existing company. Several types of in-house venturing activities as well as venture capital investment, licensing, alliances, joint ventures, and a variety of collaborations will be discussed. Organizational structure and culture that help manage in-house ventures are included as well.

TIM 631 Leading Innovation and Change [혁신과 변화의 리더십]

The objective of this course is to understand the process of adopting and spreading creativity, innovation, and changes within an organization. Students will understand the different types of organizational innovation, search for factors from inside and outside of the organization that influence the success of innovation, and learn about the role of leadership and change management.

TIM 632 Technology Value and Evaluation [기술가치 평가]

This course will focus on the methodology for assessing the value of technical knowledge, and includes the following topics: 1) The concept and options of technology valuation, 2) technology valuation models and methodology, 3) the important elements of technology valuation (market evaluation, intellectual property protection, commercialization strategies, commercialization plans and revenue)

TIM 633 Law and Intellectual Property Management [법과 지적재산권 관리]

This course deals with the comprehensive and practical application of intellectual property and covers topics such as intellectual property laws, industry competition, and the use of new technologies. Students will learn the effective use and strategic management practices of IP, which is used as a means to achieve technical and business objectives.

TIM 634 Disruptive/Radical Innovation and Practice [불연속 혁신과 실제]

Ways to embrace discontinuous innovation like disruptive and radical innovation in corporations are the main focus of this course. Students will identify the various reasons why introducing disruptive and radical innovation in the organization is difficult and navigate technical, organizational, and cultural solutions through an in-depth case analysis.

TIM 635 Technology Road-mapping for Strategy & Innovation [전략과 혁신을 위한 기술 로드맵핑]

Road-mapping techniques are used by many companies as a useful tool for creating social and economic value from technology. Through theory and practice, students will analyze how companies achieve strategic and innovative goals using technology road-mapping.

TIM 636 Regional Innovation Systems and Technology Policy [지역혁신 시스템과 기술정책]

The role of science, technology, and innovation in the economic development of emerging countries and regions is highlighted and analyzed in this course. It deals with the concepts needed to understand the role of technological innovation in economic growth, the institutional innovation transforming existing economies, technological catch-up, take-off strategies, and innovation policies to mobilize these efforts.

TIM 637 Open Innovation and Technology Acquisition Strategy [개방혁신과 기술획득 전략]

This course deals with theoretical and practical issues related to the acquisition of technology, which is one of the key activities for open innovation. Students will learn how to identify and forecast core technology or technology in need using future market requirements, consumer trends, technological developments, and patent trends. They will also learn how to manage specific methods of acquisition such as patent purchases, technical collaboration, licensing, etc.

TIM 638 Product Design and Development [제품 설계 및 개발]

Groups of students with various career backgrounds (management, engineering, industrial design, etc.) will learn modern tools and methods for product design and development. This project will develop a model/prototype of an actual product, including all phases of product development. Classes are conducted through case studies and exercises. Topics include: product planning, confirmation of customer needs, derived concepts, product design, industrial design, concept design, and design for manufacturing.

TIM 639 Project Management [프로젝트 관리]]

This course covers the key issues for effective project management. Students learn process and scope management that are essential for project management, schedule management, cost management, personnel management, communications management, risk management, and procurement management.

TIM 640 Business Models for High-Tech Products [하이테크 제품을 위한 비즈니스 모델]

This course helps develop a business model for high-tech products and services. For a successful business model, consistency between important factors, such as the target customer, the proposed value, the range of activities, the value acquisition method, and strategic control, is needed. Students verify the consistency of a wide range of business models through various examples of industries, and learn how to respond in different situations.

TIM 641 Manufacturing Systems and Supply Chain Design [제조 시스템과 공급망 설계]

This course helpsdecision makers to make better decisions in the design of manufacturing and supply chain systems. Students learn approaches and models that help understanding and structuralizing the trade-offs and essential tasks in designing various systems. In particular, models, methodology, and software that are related to logistic network design, capacity planning, system flexibility, purchase-development issues, and the integration of product development are covered.

TIM 642 Knowledge Management and Innovation [지식경영과 혁신]

In the knowledge-based economy, intellectual property management is indispensable to create and maintain the competitiveness of enterprises. This course covers tools to understand how organizations generate knowledge, share,

utilize, integrate and explores knowledge for creating competitive advantage. Several special topics such as knowledge transfer, knowledge reuse, and the development of innovative new products/services are also addressed.

TIM 643 Global R&D Management [글로벌 연구개발 관리]

Students learn the principles to systematically organize and manage R&Din international high-tech companies. The course covers the 3rd-generation research and development management techniques implemented in international conglomerates, the strategic role of R&D, organizational issues in R&D, risk/revenue assessment, open innovation, and configuring global R&D systems. It also introduces a 4th-generation R&D management, consisting of radical innovation and disruptive innovation.

TIM 644 Negotiation and Deal-Making in Technology Industries [기술 산업에서의 협상과 거래]

This course discuss and practice a set of negotiation and deal making skills that the technology managers and entrepreneurs can use in the process of technology adoption and commercialization. Students learn how to resolve differences in perspectives, time constraints, licensing negotiation, etc., by using various tools such as simulations and mock negotiations.

TIM 645 Managerial Economics [관리경제학]

This course helps create an optimal strategy through economic analysis in a given economic environment. The course deals with the main topics of micro and macroeconomics such as the characteristics of modern enterprise, organization structure design, reward systems, internal labor markets, capital markets, and basic game theory.

TIM 646 Technology Licensing Management [기술라이센싱 경영론]

This course is aimed to provide for students of department of TIM and related majors on licensing, a core biz model of technology commercialization based upon intellectual property rights. Licensing is a kind of contract, permitting a right to use of technology based on intellectual property rights and taking royalty in return thereof, and one technology, intellectual property rights, contracts and negotiation etc, and this course will provide overall knowledge and practical skills.

TIM 651 Special Topics in TIM I

This course is designed to discuss contemporary topics in Technology & Innovation Management. Actual topics and cases will be selected by the instructor and may vary from term to term.

TIM 652 Special Topics in TIM II

This course is designed to discuss contemporary topics in Technology & Innovation Management. Actual topics and cases will be selected by the instructor and may vary from term to term.

TIM 653 Special Topics in TIM III

This course is designed to discuss contemporary topics in Technology & Innovation Management. Actual topics and cases will be selected by the instructor and may vary from term to term.

TIM 691 Industry Internship [산업 인턴십]

Students will experience and gain insight on real technology management problems through internships in domestic enterprises, small and medium venture companies, or UNIST family companies. Students are encouraged to discuss with mentors and advisors before and after the internship, and then turn in a written report.

TIM 692 Global Study Mission [글로벌 스터디미션]

Students will have problem solving in-class discussions, learn the latest information and trends in the field of technology start-ups and IT & industrial big data for half a semester within UNIST, then find solutions to problems that are discovered by visiting global leading companies, and build a global network at the same time.

TIM 693 Global Consulting Internship [글로벌 컨설팅 인턴십]

In order to acquire technology management experience from domestic and foreign companies, students will be dispatched or consult on the project of an enterprise.

TIM 694 Capstone Project [캡스톤 프로젝트]

This is a project course to solve the real-life problems of businesses. Students will apply the principles of technology management and plan problem-solving through on-site problem identification, problem analysis, site visiting, and identification of solutions. After the completion of the project, students must turn in a written report.

TIM 695 Technology Innovation Management Consulting Project [기술혁신경영컨설팅]

In this action learning course, teams of business owners, students, professors, and technology/consulting experts in certain technology areas find out actionable holistic solutions for SME/venture firms that aspire to becoming a global champion in the selected areas. This course helps learn and experience how to assess a SME/venture's managerial as well as innovation capabilities and with the help of industry experts develop an actionable solution for matching its technologies and market demands, and vice versa.

TIM 710 Research Methodology [연구방법론]

The primary objective of this course is to learn key issues and approaches of scientific research methodology and provide the theoretical bases to effectively apply qualitative and quantitative research methods in business disciplines. It help students to formulate research questions, do independent literature research, analyze/interpret qualitative and quantitative data, and establish evaluation criteria.

TIM 711 Research Methodology on Technology Management [기술경영 연구방법론]

Students will learn the quantitative and qualitative methodologies needed for research in advanced manufacturing, technology commercialization and entrepreneurship, and strategic management of technology. Advanced statistical analysis, experimental design, and simulation used for the analysis of the IP is included as well.

TIM 712 Technology Commercialization and Entrepreneurship Theory Seminar [기술사업화 및 창업 이론 세미나]
Students will discover various complex phenomena associated with technology commercialization and entrepreneurship and learn theories to explain them. Students will utilize concepts from economics, psychology, organizational behavior, and strategy and have to write a paper on a specific research topic at the end of the semester.

TIM 713 Industrial Innovation Theory Seminar [산업혁신 이론 세미나]

Students will discover technological and behavioral phenomena associated with the issues that occur when applying big data and ICT to industrial sites. They will solve and explain the issues by using various theories. Students are also expected to write a paper on a specific research topic at the end of the semester.

TIM 714 Technology Management Theory Seminar [기술경영 이론 세미나]

This course deals with the applications of recent research and techniques on technology and innovation theories.

TIM 715 Strategic Management Theory Seminar [경영전략 이론 세미나]

This course is to discuss strategy theories. Students read major papers and literature about competitive strategy, corporate strategy, corporate governance, innovation, entrepreneurship, growth, restructuring, diversification, M&A, and networks and write a term paper that fills the gap in the existing literature.

TIM 716 Advanced Microeconomics [고급 미시경제학]

Students will learn about various theories of microeconomics and write a paper on technology management topics by using microeconomic theory.

TIM 717 Advanced Econometrics [고급 계량경제학]

Students will learn the essential statistical methodologies required for doctoral research and experience various approaches of multivariate analysis such as panel analysis.

TIM 718 Corporate Finance Theory Seminar [기업재무 이론 세미나]

This course introduces the theory of recent and classic corporate financial management. In particular, it deals with decisions regarding corporate financial management such as capital budgeting, capital structure, dividend policy, IPOs, mergers and acquisitions, divestitures, and corporate valuation. Students will pick a topic of interest among these and write a research paper that describes prior research, data collection, empirical analysis, and interpretation of results and conclusions.

TIM 890 Research [논문연구]

Students write a dissertation based on a proposal, which has been approved by an advisor.

TIM 891 Independent Study [개별연구]

Students perform an in-depth independent study under the guidance of a supervisor.

CDE 511,521,522,531,532 Integrated Design Project I, II-A/B, III-A/B 통합디자인프로젝트I, II-A/B, III-A/B

The integrated design project I, II-A/B, III-A/Bare a series of project-based industry collaborative courses where students carry out elementary, intermediate, and advanced levels of independent projects for three semesters from the first semester of Masters Courses, through which students will learn and develop integrated, holistic knowledge and skill necessary for product development. These are mandatory courses for Masters Students in Industrial Design program. Taking design problems from industry, students will experience total approach toward product development from opportunity identification through concept generation, design engineering, and design verification with prototyping to development of business model. At the end of each semester, students demonstrate working prototypes of new product, product-service, or product-system concepts and file related patents. Student learning takes a balanced approach between contemporary theoretical knowledge and its pragmatic application through projects supervised by academic and industrial experts.
- IDP 2: advisor-driven: 8 weeks group, 8 week individual
- IDP 3: student-driven: students search partner companies. Work as a design consulting firm.

*CDE 512 Ideation to Visualization [아이디어 시각화]

The purpose of this course is to make students learn basic ideations to visualization skills. During the problem-posing and providing solutions through flexible thinking phases, the students will be trained to concretize their ideas and to visualize those ideas based on hands-on activity through conducting the tasks

which have been initiated by themselves. The outcomes of this course will be a log book of ideation process and sketches, final presentation and exhibition of their concepts and visualized objects.

*CDE 513 CAD for Design Engineering [디자인공학 CAD]

The purpose of this course is to train basic CAD skills to the students. Students will learn solid modeling techniques for product design. Along with this, they will learn various methods related to product design from transforming sketches on paper into 3D solid data, elaborated modeling, design engineering and visualization, to workable prototyping methods using NC or RP technologies.

*CDE 514 Engineering Technologies for Designers [디자이너를 위한 공학기술]

The students in this course will learn basic engineering skills, specifically comprising physical computing skills for the implementation of their interactive product ideas, and programming skills to control the prototypes. In particular, students will learn electronics basics and programming using Arduino and Processing by conducting step-by-step exercises. During the course, students will discuss and practice how to apply technologies from the perspective of design. At the end of the course, students will ask to develop a simple interactive prototype using easily controllable sensors and actuators.

*CDE 515 Mechanical Elements and Design [기계요소 및 디자인]

Mechanical Elements and Design is one of the four CDE preliminary courses. The focus is on understanding what types of mechanical elements are available and how they can be used as part of product design. Based upon the understanding, students create a concept appropriate to a topic given by the responsible lecturer with a consortium of stakeholders and build a working prototype mainly using mechanical elements. In this way the students gain hands-on experience of and learn how to apply mechanical elements to product design. This course features a design-by-making approach for a real stakeholder.

Teaching plan for required courses of first semester

Courses	1st semester	
	8 weeks	8 weeks
Integrated Design Project I	Design research, user research, opportunity identification	Co-project: Students should fulfill each course's requirement while completing a project.
* Ideation to Visualization	Ideation, sketch, drawing, engineering drawing	
* CAD for Design Engineering	Solid CAD modelling, Assembly, Design engineering	
* Engineering Technologies for Designers	Programming, basic electronics & circuits	
* Mechanical Elements & Design	Mechanical elements, mechanical, functional prototyping	

DHE 581 Additive Manufacturing [고등적층제조]

This course studies the systematic process to extract the technological principles and knowhow of existing products and other systems. In particular, the course introduces some methods to digitize an existing physical part (e.g. 3D scanning) and construct CAD models of the parts. The concepts and tools for rapid prototyping such as Fused Deposition Method (FDM), Stereo Lithography Apparatus (SLA), Selective Laser Sintering equipments (SLS) and other 3D printing technologies will be introduced.

DHE 572 Product Lifecycle Management [PLM]

This course studies the concept and application of product lifecycle management (PLM), and covers Beginning of Lifecycle (BOL), Middle of Lifecycle (MOL), and End of Lifecycle (EOL) managements while placing emphasis on emerging information technologies and decision making issues. Through this course, the student will learn the in-depth understanding of lifecycle engineering.