**PhD Program**

**Industrial Engineering and Management Department, Yuan Ze University**

 (Applicable for the students enrolled in the academic year 2022/23)

Passed by the 6th Academic Affairs Meeting, Academic Year 2021, on April 20, 2022

**◎Course Requirements**

A minimum of 33 credit hours are required for graduation, which includes 3 credit hours for compulsory course, 24 credit hours for elective courses and 6 credit hours for dissertation. Graduate student must complete the Academic Research Ethics Education Course according to the regulations of Yuan Ze University Academic Research Ethics Education Course Implementation Highlights, before the end of the first academic semester. At the latest, the course must be completed and passed before the Advanced Examination application. The student will not be allowed to proceed the Advanced Examination without completing the Academic Research Ethics Education Course completion. Course requirement details are as follows:

1. Compulsory course (3 credit hours): ”IE608 Technological English” 3 credit hours – The student whose English examination result reaches the following criteria may apply for remittal.

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| Cambridge Main Suite | BULATS | FLPT | CEP | TOEFL | TOEIC | TOEIC Speaking and Writing Tests | CSEPT | IELTS | ILTEA |
| Written Total Score | Oral | Written | CBT/IBT | 2nd Level |
| First Certificate in English (FCE) | ALTE Level 3 (60-74) | 195-239 | S-2+ | B2 Vantage | 543 | 72 | 785 | 310 | 240-360 | 5.5 | B2  |

1. Elective courses (24 credit hours): The student can select up to 3 graduate courses from other departments at YZU to count toward graduation course requirements (3 of the 8) with the approvals of the dissertation adviser and the IEM Chair.

**◎Mandatory Elective – Chinese (1 academic year, 4 credits)**

A minimum of 4 credit hours of Chinese language courses are required for graduation. The 4 credit hours can be waived by the TOCFL Level 1 or above certificate, or equivalent (including listening, reading, speaking, and writing). For the student who received a master's degree from IEM of YZU, he/she can either take 4 credit hours of Chinese language courses or get a credit waiver via previously not used TOCFL L1, above, or equivalent.

* **Fundamental Qualifying Examination**
1. Graduate students are required to complete four out of the following five courses (taken in undergraduate or master period can be counted) in order to pass the Fundamental Qualifying Exam. The corresponding substitutes are also listed below:

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| **Fundamental Qualifying Course Name****(Undergraduate Level)** | **Substitute Course Name****(Graduate Level)** |
| Production Planning and Control (I) | Advanced Production Planning and Control |
| Quality Control (with lab) | Advanced Quality Control |
| Engineering Statistics | Experimental Design |
| Operations Research | Mathematical Programming (I) |
| Facilities Planning (with lab) | Advanced Facility Planning |

1. The abovementioned substitute courses can be counted toward the elective courses requirement if they are taken while studying during the IEM PhD program.
2. The ”Dissertation Adviser Agreement” must be completed and turned in after passing the Fundamental Qualifying Exam signed by the dissertation adviser.
* **Advanced Examination**

Student is required to complete the Fundamental Qualifying Examination and the course requirements before applying for the Advanced Examination. TheAdvanced Examination related rules are as follows:

1. PhD Graduate students should complete the Advanced Examination within the first 4 academic years (not including temporary leaves).
2. Prior to the Advanced Examination, the student must turn in the Application Form of the PhD Advanced Examination.
3. In accordance with the specialty and requests of dissertation committee members, the examination may be conducted in written, oral or both formats. The committee must be comprised of a minimum of three members (include the dissertation advisor), at least 1/3 of which should be associate (or above level) professor.
4. Upon completions of the Fundamental Qualifying Examination and Advanced Examination, the student becomes a PhD candidate.

**◎Dissertation Proposal Defense**

Three months after passing the Advanced Examination, the PhD candidate can apply for the Dissertation Proposal Defense and form the dissertation committee comprising at least 5 members (including dissertation advisor) from in and outside of YZU with 1/3 or above from each. The related rules are as follows:

1. The committee members from the IEM department shall be the same as in the Advanced Exam. If any changes are needed, the PhD candidate must apply and obtain the committee agreement with IEM approval.
2. The committee is responsible for conducting oral examination with respect to the proposal. A written examination of a specialized subject related to the proposed research may be requested by the committee.
3. Prior to the Proposal Defense, the PhD candidate must turn in ”Dissertation Proposal Check List”, ”Dissertation Advisor’s Recommendation” and ”Dissertation Proposal Form”. The student must turn in ”Dissertation Proposal Approval Form” after passing the Dissertation Proposal Defense.

**◎Dissertation Defense**

Dissertation Defense can only be applied after three months of the Dissertation Proposal Defense and the completion of publication requirements. The related rules and regulations are as follows:

1. Two or more articles must be published in renowned journals, with at least one in SSCI/SCI class journals or two in EI class journals. The published articles must originate from and directed related to the dissertation and must be accepted with proven acceptance letters to satisfy publication requirements. Other than student’s dissertation adviser, the student needs to be the first author of the published articles. If the following situations occur, the number of papers will be counted differently:
	1. Articles with author(s) who is (are) not the student’s committee member(s): can only be counted as one-half paper.
	2. Articles with authors of other students: can only be counted as one-half paper.
	3. Articles with both cases i.) and ii.): can only be counted as one-fourth paper.
2. One or more conference papers are published in domestic or international conference proceedings and presented in international conference.
3. Committee members should be the same for both the Dissertation Proposal Defense and the Dissertation Defense. If not, the student must apply and obtain the committee agreement with IEM approval.
4. Prior to the Dissertation Defense, the PhD candidate must turn in the ”Dissertation Defense Check List”. After the Dissertation Defense, the ”Final Defense Grading Report” and the ”Dissertation Defense Report Form” must be turned in to the IEM office.

**◎This regulation has been implemented with the approval of IEM departmental meeting. Any amendment will also be implemented with the same process.**

**Industrial Engineering and Management Department, Yuan Ze University**

**for the Doctor of Philosophy Degree**

**List of Elective Courses (not all taught in English)**

**（111學年度入學新生適用Academic Year 2022. Sept.~）**

Passed by the 6th Academic Affairs Meeting, Academic Year 2021, on April 20, 2022

Amended by the 3rd Academic Affairs Meeting, Academic Year 2022, on November 28, 2022

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| 類別 | 課號 | 中文課名 | 英文課名 | 學分數 |
| 企業電子化與全球運籌管理（一） | IE517 | 存貨系統與管制 | Inventory Systems and Control | 3 |
| IE537 | 高等設施規劃 | Advanced Facilities Planning | 3 |
| IE576 | 全球運籌管理 | Global Logistics Management | 3 |
| IE579 | 運輸管理 | Transportation Management | 3 |
| IE591 | 物流系統 | Analysis of Material Flows and Distribution System | 3 |
| IE602 | 產業電子化營運模式 | The Operational Models of E-Enterprise | 3 |
| IE604 | 企業資源規劃 | Enterprise Resources Planning | 3 |
| IE609 | 電子化企業之管理 | The Management of Enterprise Digitization | 3 |
| IE610 | 行動電子商務 | Mobile Commerce | 3 |
| IE613 | 供應鏈管理專題 | Topics in Supply Chain Management | 3 |
| IE616 | 進階企業資源規劃 | Advanced Enterprise Resources Planning | 3 |
| IE618 | TFT-LCD產業分析與個案探討 | TFT-LCD Industry Analysis and Case Study | 3 |
| 智慧型系統與數位內容管理類（二） | IE502 | 自動視覺檢驗技術 | Automatic Visual Inspection | 3 |
| IE508 | 人工智慧與專家系統專題 | Artificial Intelligence and Expert System Topics | 3 |
| IE510 | 電腦繪圖 | Computer Graphics | 3 |
| IE544 | 電腦輔助設計與製造（一） | Computer-Aided Design and Manufacturing (I) | 3 |
| IE562 | 3D視覺模擬和虛擬實境 | 3D Visual Simulation and Virtual Reality | 3 |
| IE564 | 軟性計算之不確定分析 | Uncertainties in Soft Computing | 3 |
| IE574 | 資料視覺 | Data Visualization | 3 |
| IE585 | 類神經網路 | Neural Networks | 3 |
| IE590 | 機器視覺應用 | Machine Vision | 3 |
| IE599 | 資料探勘 | Data Mining | 3 |
| IE607 | 啟發式最佳化 | Heuristic Optimization | 3 |
| IE612 | 傅立葉與小波分析 | Fourier and Wavelet Analysis with Application | 3 |
| IE614 | 資料模式辨識與分類 | Data Pattern Recognition and Classification | 3 |
| IE617 | 產品生命週期管理 | Product Lifecycle Management | 3 |
| IE619 | 虛擬實境系統設計與建構 | Design and Construction of Virtual Reality Systems | 3 |
|  | IE625 | 巨量資料分析 | Big Data Analytics | 3 |
|  | IE626 | 物聯網概論與實務 | Introduction and Practice of Internet of Things (IOT)  | 3 |

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| 類別 | 課號 | 中文課名 | 英文課名 | 學分數 |
| 決策最佳化與系統管理類（三） | IE503 | 模擬學 | Simulation | 3 |
| IE505 | 隨機過程（一） | Stochastic Processes (I) | 3 |
| IE507 | 數學規劃（一） | Mathematical Programming (I) | 3 |
| IE518 | 時間序列分析 | Time Series Analysis and Forecasting | 3 |
| IE519 | 動態規劃 | Dynamic Programming | 3 |
| IE528 | 數學規劃（二） | Mathematical Programming (II) | 3 |
| IE533 | 機率分析 | Probabilistic Analysis | 3 |
| IE538 | 實驗設計 | Experimental Design and Applications | 3 |
| IE541 | 決策分析 | Decision Analysis | 3 |
| IE548 | 等候理論 | Queuing Theory | 3 |
| IE561 | 數據分析 | Statistical Methods and Data Analysis | 3 |
| IE577 | 數理統計（一） | Mathematical Statistics (I) | 3 |
| IE582 | 網路分析 | Network Analysis | 3 |
| IE605 | 多變量分析 | Multivariate Analysis | 3 |
| IE611 | 模糊系統之設計與最佳化 | Data-driven Fuzzy Systems Design and Optimization | 3 |
| IE615 | 模糊工程與資訊 | Fuzzy Engineering and Information | 3 |
| IE904 | 科學研究方法論 | Scientific Research Philosophy & Methodology | 3 |
| IE620 | 反應曲面法與製程最佳化 | Response Surface Methodology and Process Optimization System | 3 |
| EG501 | 統計實驗設計與應用 | Statistical Experimental Design and Application | 3 |
| 生產系統與服務業管理類（四） | IE520 | 田口式品質工程 | Taguchi Quality Engineering | 3 |
| IE531 | 高等品質管制 | Advanced Quality Control | 3 |
| IE534 | 生產排程 | Production Scheduling | 3 |
| IE540 | 電腦整合製造 | Computer Integrated Manufacturing | 3 |
| IE543 | 生產計劃 | Production Planning | 3 |
| IE549 | 行為決策分析 | Behavioral Analysis of Decision Making | 3 |
| IE555 | 群體決策分析 | Group Decision Making | 3 |
| IE565 | 人因工程 | Human Factors | 3 |
| IE566 | 可靠度工程 | Reliability Engineering | 3 |
| IE571 | 高等工程經濟 | Advanced Engineering Economics | 3 |
| IE581 | 服務系統設計 | Service System Design | 3 |
| IE592 | 及時生產系統 | Just-in-Time Production System | 3 |
| IE593 | 高等生產管制 | Advanced Production Control | 3 |
| IE603 | 進階生產排程 | Advanced Production Scheduling | 3 |
| IE606 | 進階企業診斷 | Advanced Enterprise Diagnostics | 3 |
| IE621 | 知識服務業管理 | Knowledge Service Industry Management | 3 |
| IE524 | 工程管理系統 | Engineering Management Systems | 3 |
| IE622 | 卓越經營管理 | Managing for Business Excellence | 3 |
| IE623 | 人因設計 | Ergonomic Design | 3 |
| IE624 | 優使性工程 | Usability Engineering | 3 |
|  | IE630 | 進階專案管理 | Advanced Project Management | 3 |