化学工学専攻

Ⅰ．志望区分

志望区分	研究内容	対応する教育プログラム		
		連携教育プログラム（融合工学コース）	連携教育プログラム（高度工学コース）	修士課程教育プログラム
1	**化学工学基礎講座　ソフトマター工学分野** 移動現象論、複雑流体・ソフトマターの移動現象や非平衡プロセスに関する基礎的研究、特に、計算機シミュレーションを用いた高分子液体・コロイド分散系・ベシクル・細胞組織などに関する基礎研究	応用力学分野 物質機能･変換科学分野	化学工学専攻の定める教育プログラムに従う	化学工学専攻の定める教育プログラムに従う
2	**化学工学基礎講座　界面制御工学分野** 界面制御工学、ナノ拘束空間工学、特に、分子やイオンのナノ細孔空間内特有の挙動と構造、吸着場や液膜場によるナノ粒子群の構造形成と制御、秩序相・固相発生過程の基礎研究	応用力学分野 物質機能･変換科学分野		
3	**化学工学基礎講座　反応工学分野** 反応工学、材料反応工学、電気化学反応工学、特に、気相材料合成反応の機構解明によるモデリングと材料開発、燃料電池等の電気化学反応のモデリング、劣質炭素資源の新しい転換プロセスの開発	物質機能・変換科学分野		
4	**化学システム工学講座　分離工学分野** 分離工学、吸着工学、乾燥工学、特に、電界や微生物を利用した新規分離法の開発	物質機能・変換科学分野		
5	**化学システム工学講座　エネルギープロセス工学分野** エネルギープロセス工学、材料工学、電子工学、光工学、ナノテクノロジー、特に、自然・再生可能エネルギー生成、高効率エネルギー利用など、資源および環境問題の解決につながる技術の開発	応用力学分野 物質機能・変換科学分野		
6	**化学システム工学講座　材料プロセス工学分野** 高分子加工学、特に機能性材料開発（微細発泡成形）、超臨界流体利用材料加工、マイクロ化学システムの開発、高分子複合材料の結晶化過程の制御、多成分高分子材料の可視化分析技術の開発	物質機能・変換科学分野 生命・医工融合分野 総合医療工学分野		
7	**化学システム工学講座　プロセスシステム工学分野** プロセスシンセシス、プロセスの最適設計・操作、プロセス制御・監視・データ解析、マイクロ化学プラントの最適設計・操作に関する研究	応用力学分野 物質機能･変換科学分野		
8	**環境プロセス工学講座** 環境プロセス工学、マイクロ化学操作論、環境反応工学、特に、バイオマスの新規転換法の開発、マイクロリアクターの開発と設計・操作論	物質機能・変換科学分野		
9	**化学システム工学講座　粒子工学分野** 粒子工学、粉体工学、エアロゾル工学、特に、粉体特性の評価と制御、及び微粒子に係わる静電効果の解析と応用	応用力学分野 物質機能･変換科学分野		
10	**化学システム工学講座　環境安全工学分野** 環境安全工学、有害物質管理工学、特に廃棄物の安全で効率的な有効利用法の開発に関する研究、難分解性有害物質の効率的除去方法の開発に関する研究	物質機能･変換科学分野		

詳しい研究内容については，ホームページ http://www.ch.t.kyoto-u.ac.jp/ja を参照

Ⅱ．募集人員

化学工学専攻　34 名

Ⅲ．出願資格

募集要項 4 ページ「**Ⅱ-i 出願資格**」参照

Ⅳ．学力検査日程

８月２２日（月）	８：３０ ～９：３０ 英語	１０：００ ～１２：３０ 専門科目１	１３：３０ ～１６：００ 専門科目２	１６：３０ ～１８：３０ 面接

Ⅴ．入学試験詳細

(1) 科目、出題範囲

［英語］配点 200 点

英文読解など。辞書の使用は許可しない。

［専門科目１］配点 400 点

化学工学量論（熱力学含む）、移動現象（2 題）、分離工学（2 題）、粒子工学、プロセス制御（以上 7 題から 4 題選択）。ただし、移動現象の出題範囲は、流動、伝熱、拡散とし、分離工学の出題範囲は、ガス吸収、蒸留、吸着、乾燥、抽出とする。

［専門科目２］配点 400 点

基礎物理化学、基礎有機化学、化学工学数学、反応工学（2 題）、プロセスシステム工学（以上 6 題から 4 題選択）。ただし、化学工学数学の出題範囲は、微分積分学、線形代数学、常微分方程式、ベクトル解析、複素解析、偏微分方程式とする。

専門科目１、専門科目２の試験は日本語による出題で、試験時に電卓を貸与する

(2) 有資格者及び合格者決定法

総得点 500 点以上を有資格者とする。ただし、問題の難易度に応じて有資格判定の基準点を調整することがある。有資格者の成績上位者から合格者を決定する。

Ⅵ. 入学後の教育プログラムの選択

修士課程入学後には6種類の教育プログラムが準備されている。本専攻の入試に合格することにより履修できる教育プログラムは下記の通りである。

(a)博士課程前後期連携教育プログラム　融合工学コース（応用力学分野）
(b)博士課程前後期連携教育プログラム　融合工学コース（物質機能・変換科学分野）
(c)博士課程前後期連携教育プログラム　融合工学コース（生命・医工融合分野）
(d)博士課程前後期連携教育プログラム　融合工学コース（総合医療工学分野）
(e)博士課程前後期連携教育プログラム　高度工学コース（化学工学専攻）
(f)修士課程教育プログラム　化学工学専攻

いずれのプログラムを履修するかは、受験者の志望と入試成績に応じて決定する。合格決定後の適切な時期に志望を調査するので、合格決定後の指示に従うこと。

詳細については、「**Ⅰ．志望区分**」を参照のこと。また、教育プログラムの内容については、ホームページ（https://www.t.kyoto-u.ac.jp/ja/education/graduate/dosj69）及び、次項の「**Ⅶ．教育プログラムの内容について**」をそれぞれ参照すること。

なお、入学後の研究室配属の希望調査も、教育プログラムの志望調査とあわせて、合格決定後におこなう。

Ⅶ. 教育プログラムの内容について（高度工学コース・修士課程教育プログラム）

【高度工学コース】

化学工学は、基礎科学の成果をより迅速に、かつ環境に配慮しながら生産活動や社会福祉として結実するための多様な要求に対応するための基盤工学です。高度工学コースでは、高度の教養と人格を備えた研究者・高級技術者として独立して活動するための実践的訓練を行うことにより、高度な専門知識と柔軟な思考力および豊かな想像力を修得させます。より具体的には、研究テーマの選定、研究の計画、実施、発表の過程を可能な限り自主的に進めさせるとともに、常に世界的に評価され得る創造的な研究を遂行するよう指導します。さらに、他専攻、他研究科、国外研究機関との共同研究の機会を積極的に与え、協調能力、提案能力、発表能力、国際性を身につけさせます。またTAのほか、学部の特別研究の指導などにも参加させ、研究指導者としての能力をも身につけさせます。これらを通じて、高度な研究遂行能力をもった国際的に活躍できる研究者、新たな化学工学の基盤を創製し得る研究者、さらには研究をマネージメントし得る指導者を育成します。

【修士課程教育プログラム】

化学工学は、基礎科学の成果をより迅速に、かつ環境に配慮しながら生産活動や社会福祉として結実するために、21世紀に求められている高度で複雑な機能性物質・材料の開発、エネルギー・環境と調和した各種生産装置・技術の開発などの多様な要求に対応できる基盤工学です。修士課程においては、この基盤工学の骨格を講義を通じて学ばせるとともに、世界最先端の研究に従事させることによってその真髄を習得させます。これらの教育・研究を実施する過程での、教員との議論、学生間の議論、教員・外部の技術者・他の学生との共同研究、学会での発表等を通じて、高級技術者としての意思疎通能力、協調能力、提案能力、発表能力、倫理観等を養わせます。さらに、TA(Teaching Assistant)などの形で教育補助を行わせ指導者としての要件を体得させます。これらの素養を備えた高級技術者を育成することによって、社会の発展に寄与します。

Ⅷ. その他

集合時間および集合場所について

試験当日は、試験開始 20 分前までに化学工学専攻試験場前に集合すること。試験場については後日通知する。

入退室について

試験開始時間から 30 分以降は入室できない。また、試験開始後、当該科目の試験時間中は退室できない。

面接について

化学工学専攻の受験者全員について面接を行うので、受験者は 8 月 22 日（月）専門科目２の終了後、16:20 までに面接控室（後日通知する）に集合すること。

電卓の貸出しについて

化学工学専攻の試験中に使用する電卓を、機能確認のために事前に貸出する。希望者は下記の時間帯に桂キャンパスＡクラスター事務区教務掛に取りに来ること。

貸出時間帯　　8 月 4 日（木）10：00～16：00

＊注意：電卓の機種・機能の確認後は、速やかに上記時間内に同事務室に返却のこと。

携帯電話について

携帯電話は必ず電源を切り、かばん等に入れ所定の場所に置くこと。試験中、携帯電話を時計として使用することも禁止する。試験中に携帯電話等の通信機器の所持が判明した場合は，不正行為と見なされる場合がある。なお、時計（通信機能のないものに限る）については各自で用意すること。

問合せ先･連絡先

〒615-8510　京都市西京区京都大学桂
京都大学大学院工学研究科 A クラスター事務区教務掛(化学工学担当)
電　話：075-383-2077
E-Mail：090kakyomu@mail2.adm.kyoto-u.ac.jp
参　照：http://www.ch.t.kyoto-u.ac.jp/ja

※The Japanese language version of the information provides here is to be given precedence.

Department of Chemical Engineering

I. Preferred Research Area

Research Area	Research Descriptions	Applicable Courses		
		Integrated Course Program (Interdisciplinary Engineering Courses)	Integrated Course Program (Advanced Engineering Courses)	Master's Course Program
1	Soft Matter Engineering: Chemical Engineering Fundamentals Transport Phenomena, fundamental research on transport phenomena of complex fluids and soft matters, and non-equilibrium process, especially the fundamental research on polymer liquids, colloidal dispersion, vesicle, and cellular structures using computer simulations	Applied Mechanics Materials Engineering and Chemistry	According to the course program established by the Department of Chemical Engineering	According to the course program established by the Department of Chemical Engineering
2	Surface Control Engineering: Chemical Engineering Fundamentals Surface Control Engineering, Engineering for Nanoscale Confined Space, especially behaviors and structures specific to the nanoporous spaces of molecules and ions, structure formation and control of nanoparticle aggregate in adsorption field or within wetting films, and fundamental study on ordered-phase/solid-phase generation	Applied Mechanics Materials Engineering and Chemistry		
3	Chemical Reaction Engineering: Chemical Engineering Fundamentals Reaction Engineering, Material Reaction Engineering, and Electrochemical Reaction Engineering, especially modelling by analyses on the mechanism of reaction for the synthesis of materials via chemical-vapor deposition and development of materials, modelling of electrochemical reaction, and development of new conversion processes of carbonaceous resources	Materials Engineering and Chemistry		
4	Separation Engineering: Chemical Systems Engineering Separation Engineering, Adsorption Technology, Drying Technology, Food Engineering and development of new separation methods utilizing electric fields and microorganisms	Materials Engineering and Chemistry		
5	Energy Process Engineering: Chemical Systems Engineering Energy Process Engineering, Materials Engineering, Electronic Engineering, Optical Engineering, and nanotechnology, especially development of the technologies to solve resource and environmental problems, such as natural/renewable energy production and high-efficiency energy utilization	Applied Mechanics Materials Engineering and Chemistry		
6	Materials Process Engineering: Chemical Systems Engineering Polymer Processing, especially development of functional materials (polymeric foaming), material processing using supercritical fluids, development of a microchemical system, control of crystallization behavior of polymer composites, and development of chemical imaging techniques of multi-component polymeric materials	Materials Engineering and Chemistry Engineering for Life Science and Medicine Integrated Medical Engineering		
7	Process Control and Process Systems Engineering: Chemical Systems Engineering Research on process synthesis, optimal design and operation of processes, process control/monitoring/data analysis, and optimal design and operation of micro chemical plants	Applied Mechanics Materials Engineering and Chemistry		
8	Environmental Process Engineering Environmental Process Engineering, Micro Chemical Operation, and Environmental Reaction Engineering, especially development of new conversion methods for biomass, Development, Design and Operation of Microreactors	Materials Engineering and Chemistry		
9	Particle Technology: Chemical Systems Engineering Particle Technology, Powder Technology, and Aerosol Technology, especially evaluation and control of powder characteristics, and analysis and application of electrostatic effects related to particles	Applied Mechanics Materials Engineering and Chemistry		
10	Environment and Safety Engineering: Chemical Systems Engineering Environment and Safety Engineering and Hazardous Materials Management Engineering, especially research on the development of safe and effective use of wastes, and research on the development of efficient removal of non-biodegradable pollutants	Materials Engineering and Chemistry		

For the details of researches, visit our website (http://www.ch.t.kyoto-u.ac.jp/ja).

II. Enrollment Capacity

Department of Chemical Engineering: 34

III. Eligibility requirements for applicants

Please refer to page 14, “II-i. Eligibility,” of the Guidelines for Applicants.

IV. Examination Schedule

August 22 (Mon.)	8:30 AM to 9:30 AM English	10:00 AM to 12:30 AM Chemical Engineering 1	1:30 PM to 4:00 PM Chemical Engineering 2	4:30 PM to 6:30 PM Interview

V. Details of entrance examinations

(1) Subject, Coverage of examination:

[English] Marks allotted: 200 points

Reading comprehension, etc. Dictionaries are not allowed.

[Chemical Engineering 1] Marks allotted: 400 points

Material and Energy Balance (including Thermodynamics), Transport Phenomena (two questions), Separation Engineering (two questions), Particle Engineering, and Process Control (four questions are to be selected out of the seven questions). The coverage of examination for Transport Phenomena includes fluid mechanics, heat transfer, and diffusion. The coverage of examination for Separation Engineering includes gas absorption, distillation, adsorption, drying, and extraction.

[Chemical Engineering 2] Marks allotted: 400 points

Fundamental Physical Chemistry, Physical Organic Chemistry, Mathematics for Chemical Engineering, Reaction Engineering (two questions), and Process Systems Engineering (four questions are to be selected out of the six questions). The coverage of examination for Mathematics for Chemical Engineering includes calculus, linear algebra, ordinary differential equations, vector analysis, complex analysis, and partial differential equations.

For Chemical Engineering 1 and 2, the questions are made in Japanese and a calculator is loaned to each applicant during the examination.

(2) Qualified applicants and how to decide successful applicants:

Applicants who score a total of 500 points and more will be qualified. Note, however, that the benchmark point may be adjusted depending on the degree of difficulty of the examination. Successful applicants are selected from the qualified applicants who score top marks.

VI. Selecting course program after enrollment

The following six courses are prepared after enrollment of the master's program. For those who passed the Department's examination, the following course programs are available.

(a) Interdisciplinary Engineering Course of Integrated Course Program: Applied Mechanics

(b) Interdisciplinary Engineering Course of Integrated Course Program: Materials Engineering and Chemistry

(c) Interdisciplinary Engineering Course of Integrated Course Program: Engineering for Life Science and Medicine

(d) Interdisciplinary Engineering Course of Integrated Course Program: Integrated Medical Engineering

(e) Advanced Engineering Course of Integrated Course Program: Department of Chemical Engineering

(f) Master's Course Program: Department of Chemical Engineering

Successful applicants' course assignment is determined based on their preference and entrance examination results. Applicants' preferred courses will be surveyed in an appropriate timing after judgement of passing the examination. Follow the instructions after the judgement.

For the details, refer to "I. Preferred Research Area." For the details of course programs, refer to the website (https://www.t.kyoto-u.ac.jp/en/education/graduate/dosj69) and "VII. Details of course programs" in the next section.

After the decision of successful applicants is made, the applicants will also be asked about which laboratories they wish to be assigned after the enrollment.

VII. Details of course programs (Advanced Engineering Course and Master's Course Program)

[Advanced Engineering Course]

Chemical Engineering is the basic engineering to respond to various demands so that the results from basic science can bear fruit in production activities and social welfare more quickly in an environment-friendly manner. In the Advanced Engineering Course, students will gain a high level of expertise, ability to think flexibly, and active imagination by receiving practical training for them to play an active role independently as a highly-educated researcher or professional engineer with great personality. Specifically, the students are required to select research themes, and plan, do, and present their researches as independently as possible and are guided to perform creative researches that can be highly regarded worldwide at all times. The students are provided with many opportunities to conduct joint researches with other departments, graduate schools, and overseas research institutions so that they can acquire abilities and skills such as cooperativeness, making suggestions/proposals, presentation skill, and internationalism. The students are also required not only to serve as a teaching assistant but also to guide special research students in undergraduate programs so that they can acquire abilities necessary to become a great research supervisor. Through these, this course aims to train researchers who have a high level of abilities to accomplish their research goals, play active roles internationally, create a base for new chemical engineering, and leaders who are able to manage researches.

[Master's Program]

Chemical Engineering is the basic engineering to respond to various demands, including the development of advanced and complex functional substances and materials sought in the 21st century and the development of various production equipment and technologies that meet environmental and energy needs, so that the results from basic science can bear fruit in production activities and social welfare more quickly in an environment-friendly manner. In the Master's program, students will learn the framework and essence of basic engineering through their participation in lectures and their engagement in the world's most advanced researches. In the course of education and researches, the students will acquire competence in communication, cooperativeness, ability to make suggestions/proposals, presentation skill, and sense of ethics, which are required to be a professional engineer, through discussions with teachers and other students, joint researches with teachers, outside engineers, and other students, and presentation at a conference. The students will learn requirements for a qualified leader by serving as an educational assistant such as a teaching assistant. By training professional engineers who acquired these accomplishments, the course will contribute to the development of society.

VIII. Other

Time and place for assembling:

On the day of examination, applicants must arrive in front of the specified room for the examination by Department of Chemical Engineering no later than 20 minutes before the examination starts. The examination room will be notified at a later date.

Entering and leaving the room:

Applicants are not allowed to enter the examination room after 30 minutes elapses from the examination start time. Besides, exiting from the room after the examination starts and during examination hours of the relevant subject is not allowed.

Interview:

All applicants for the Department of Chemical Engineering will be interviewed. They must assemble at the anteroom for interview (to be notified at a later date) before 4:20 PM after the end of the examination of Chemical Engineering 2 on Monday, August 22.

Loan of a calculator:

A calculator is loaned to each applicant in advance so that he/she can check its functions before using it during the examination in the Department of Chemical Engineering. An applicant who wishes to borrow a calculator must come to Undergraduate Student Section, Administration Office, A Cluster in Katsura Campus to pick it up.

Loan period: Thursday, August 4, from 10:00 AM to 4:00 PM

* Note: Return the calculator as soon as possible within the above period after checking the model and functions of the calculator.

Mobile phones:

Mobile phone must be turned off, put in bags, and placed at a specified place. Mobile phones must not be used as even watches during the examination. If it is found that any of applicants has a communication device such as a mobile phone in hand during the examination, it may be considered misconduct. Applicants must bring watches (without communication function) on their own.

Contact for general inquires:

Katsura, Nishikyo-ku, Kyoto 615-8510
A Cluster Office, Graduate Student Section, Katsura Campus, Katsura Campus,
Kyoto Univ. (Department of Chemical Engineering)
Phone: +81-75-383-2077
E-Mail: 090kakyomu@mail2.adm.kyoto-u.ac.jp
Reference: http://www.ch.t.kyoto-u.ac.jp/ja