

## 授業の概要 / Course description

### 科目基礎情報 / Course information

開講元学部 / Faculty	博士前期課程理工学研究科 / GRADUATE SCHOOL OF SCIENCE AND TECHNOLOGY
開講元学科 / Department	理工学専攻 / MASTER'S PROGRAM IN SCIENCE AND TECHNOLOGY
登録コード / Registration Code	MSPY7175
期間 / Period	2019年度 / Academic Year 春学期 / SPRING
学期 / Semester	春学期 / SPRING
曜限 / Period	月 / Mon 3
教室 / Classroom	月3 :10-B105B / 10-B105B
科目名 / Course title	放射光原子分子科学 / ATOMIC AND MOLECULAR SCIENCE
授業形態 / Course Type	講義 / Lecture
科目ナンバリング / Course Numbering	PHY618
レベル / Level	600
教員表示名	東 善郎
主担当教員名 / Instructor	東 善郎 / AZUMA YOSHIRO
単位数 / Credits	2
更新日 / Date of renewal	Feb 25, 2019

### 講義概要情報 / Course description

キーワード / Keywords	分光学 放射光 量子力学
科目サブタイトル / Subtitle of this course	Principles of quantum mechanics in atomic and molecular physics.
アクティブ・ラーニングの実施 / Active Learning	なし / No
授業の概要 / Course description	The lecture will cover introduction to atomic and molecular photo-processes, particularly in the context of synchrotron based experimental studies. Basic physics of atoms and molecules, experimental techniques and the principle of synchrotron radiation will be covered.
ディプロマ・ポリシー (DP) との関連 (対応するポリシーは、科目開講元のポリシーである。借入れ科目の場合は、カリキュラムマップを参照のこと) / Correspondence to Diploma Policy of the offering Faculty and Department (Students who belong to other faculties and departments, check Curriculum Map of your faculty and department)	
到達目標 (授業の目標) / Course objectives	To provide the student with enough knowledge on the experimental side and theoretical side that would enable him/her to make meaningful contribution to an actual experimental project.
授業時間外 (予習・復習等) の	Solving homework problems would be essential.

学習 / Expected work outside of class	Two hours of preparation and two hours of review each week.
他学部・他研究科受講可否 / Other departments' students	可 / Yes ※要覧記載の履修対象とする年次を確認すること。 Please make sure to confirm the student year listed in the bulletin.
評価基準・割合 / Evaluation	授業参加 / <b>Class participation</b> (20.0%) リアクションペーパー / <b>Reaction paper/in-class assignments</b> (20.0%) レポート / <b>Report</b> (20.0%) (授業期間中) 中間試験 / <b>Mid-term exam</b> (20.0%) 小テスト等 / <b>Quizzes.etc.</b> (20.0%)
テキスト (教科書) / <b>Textbook</b>	自由記述 / <b>Free Text</b> : Textbooks, reference and other materials will be discussed during the first class.
必要外国語 / Required foreign languages	English

### 講義スケジュール / Schedule

授業計画 / <b>Class schedule</b>	1.Introduction to atomic structure.
	2.Atomic structure and electron correlation.
	3.Time independent perturbation theory.
	4.Time dependent perturbation theory.
	5.Electromagnetic radiation.
	6.Fermi Golden Rule
	7.Photon interactions with atoms.
	8.Shake theory and atomic photoionization.
	9.Experimental methodologies in synchrotron based atomic physics.
	10.Experimental methodologies in synchrotron based molecular physics.
	11.The synchrotron radiation light source.
	12.Structure and design of beamlines.
	13.Recent research in ion time-of-flight spectroscopy and fluorescence spectroscopy.
	14.Recent research in electron spectroscopy.
	15.COLTRIMS technology.