

データサイエンス・エキスパートプログラム (DSEP) 科目表

- データサイエンス・エキスパート・プログラム (DSEP) およびデータサイエンス・エキスパート・プログラム・プラス (DSEP+) 二つのプログラムは、専門的なデータ分析力とそれに基づく問題解決策を提言できる実践力を兼ね備えた博士人材の育成を目的としており、一定の修了要件を満たす学生に修了認定証を授与する。DSEP および DSEP+ の修了認定を受けるために、5つのコンピテンスごとに修了要件として設定されているポイントを修得する必要がある、数理・データサイエンス・AI (MDA) と関連する4つの科目群に該当する科目を履修することにより、そのポイントを修得することができる (DSEP および DSEP+ の詳細は、<https://www.sie.tsukuba.ac.jp/dsep/>を参考にすること)。
- DSEP 科目表は、MDA 関連科目と DSEP および DSEP+ コンピテンスの関係を示しているものである。

例) 「社会工学のための数学」を履修すると「MDA 高度専門力」における2ポイントが付与される。

「リスク・レジリエンス工学博士 PBL 演習」を履修すると「MDA 分野融合力」と「MDA 創出力」の両方のコンピテンスにおいてそれぞれ2ポイントが付与される。

「MDA 後期プロジェクト研究」を履修すると「MDA 分野融合力」と「MDA 実践力」の両方のコンピテンスにおいてそれぞれ2ポイントが付与される。

前/後期	開設 部局	科目 番号	科目名	単 位	実施 学期	曜時限	備考	コンピテンス					
								MDA 高度専門力	MDA 分野融合力	MDA 創出力	MDA 実践力	MDA 卓越総合力	
								必要ポイント：6	必要ポイント：3	必要ポイント：2	必要ポイント：1	必要ポイント：2	
前期	社工	0AL0100	社会工学のための数学	2	春 AB	月 5,6		2					
後期	R2	0BLC506	リスク・レジリエンス工学博士 PBL 演習	2	通年	随時			2	2			
後期	シス情	0BL0001	MDA 後期プロジェクト研究	2	秋学期	随時			2		2		

- MDA 卓越総合力以外のコンピテンスポイントは、筑波大学の他の研究群または他大学の大学院の MDA と関連する科目に対してもポイント認定申請に基づき付与することがある。
- 具体的な履修方法などについては Manaba の MDA コースを参照すること (manaba のマイページで、MDA コースの登録キー【1443621】を用いて自己登録)。

Data Science Expert Program (DSEP) Course Table

- The DSEP and DSEP+ facilitate interdisciplinary research and doctoral theses by sharing data with various domestic and international organizations. Both programs aim to nurture doctoral talents endowed with specialized data analysis skills and the practical ability to propose data-driven solutions. Students who meet specific criteria are awarded a certificate of completion (For details on DSEP and DSEP+, refer to <https://www.sie.tsukuba.ac.jp/dsep/>).
- The DSEP course table shows the relationship between MDA-related courses and the competencies of DSEP and DSEP+.

e.g.) Taking the course 'Mathematics for Policy and Planning Sciences' will grant you 2 points in 'MDA Advanced Expertise.'

Taking the course 'Advanced Project Research in Risk and Resilience Engineering' will grant you 2 points each in the competencies of 'MDA Interdisciplinary Adaptability' and 'MDA Creativity.'

Taking the course 'MDA Advanced Project Research' will grant you 2 points each in the competencies of 'MDA Interdisciplinary Adaptability' and 'MDA Practical Applicability.'

Degree	Program	Course Number	Course Name	Credits	Term	Meeting Days, Period etc.	Remarks	Competencies				
								MDA Advanced Expertise	MDA Interdisciplinary Adaptability	MDA Creativity	MDA Practical Applicability	MDA Comprehensive Initiative
								Required points: 6	Required points: 3	Required points: 2	Required points: 1	Required points: 2
Master	PPS	0AL0100	Mathematics for Policy and Planning Sciences	2	SprAB	Mon5,6		2				
Doctor	R2E	0BLC509	Advanced Project Research in Risk and Resilience Engineering	2	Annual	by request			2	2		
Doctor	CC	0BL0001	MDA Advanced Project Research	2	Fall Semester	by request			2		2	

- Credits earned in other degree programs or graduate schools may be recognized as competence points, except for the MDA Comprehensive Initiative, if they are relevant to the MDA.
- For specific details on how to register for courses, refer to the MDA course on manaba (self-register on manaba's homepage using the MDA course registration key [1443621])."

Degree	Program	Course Number	Course Name	Credits	Term	Meeting Days/Period etc.	Remarks	Competencies				
								MDA Advanced Expertise	MDA Interdisciplinary Adaptability	MDA Creativity	MDA Practical Applicability	MDA Comprehensive Initiative
								The ability to handle highly advanced knowledge related to MDA	The ability to cross disciplinary boundaries and handle various fields using MDA.	The ability to generate new innovations related to MDA.	The ability to work knowledge related to MDA to solve social problems.	The ability to cultivate MDA professionals with comprehensive expertise and knowledge, capable of meeting the demands of society for MDA talent.
1. Courses for fostering AI technology to conduct research by utilizing cutting-edge DS and AI								Required points: 6	Required points: 3	Required points: 2	Required points: 1	Required points: 2
1-1. Mathematical applications												
Master	PPS	0AL0100	Mathematics for Policy and Planning Sciences	2	Sp+Ab	Mon,6		2				
Master	PPS	0AL0102	Social Simulation	2	Sp+Ab	Mon,2		2				
Master	PPS	0AL0103	Game Theory	2	Sp+Ab	Tue,2		2				
Master	PPS	0AL5107	Theory of Asset Valuation	2	Fa+Ab	Mon,6		2				
Master	PPS	0AL5108	Discrete Mathematics	2	Fa+Ab	Mon,4		2				
Master	PPS	0AL5109	Mathematical Optimization Theory	2	Fa+Ab	Fri,4		2				
Master	PPS	0AL5113	Microeconomic Analysis	2	Sp+Ab	Tue,6		2				
Master	SE	0ALB003	Applied Optimization	2	Sp+Ab	Fri,6		2				
Master	R2E	0AL0304	Advanced Course on Mathematical Model Analysis	2	Sp+Ab	Tue,6		2				
Master	R2E	0AL0305	Theoretical Environmental Analysis	2	Fa+Ab	Fri,4		2				
Master	R2E	0AL5300	Seminar in Modeling of Energy and Environment Systems	2	Fa+Ab	Wed,2		2				
Master	CS	0AL5406	Systems and Optimization	1	Sp+Ab	Fri,4		1				
Master	CS	0AL5407	Systems and Control	1	Sp+Ab	Thu,4		1				
Master	CS	0AL5419	Basic Computational Biology	2	Fa+Ab	Thu,2		2				
Master	CS	0AL5420	Advanced Course in Computational Linguistics	2			Not offered for 2023	2				
Master	CS	0AL5427	Special Lecture on Numerical Simulation	2	Sp+Ab	Mon,6		2				
Master	CS	0AL5428	Advanced Course in Computational Algorithms	2	Fa+Ab	Fri,4		2				
Master	IMIS	0AL5502	System Modeling	2	Fa+Ab	Fri,4		2				
Master	IMIS	0AL5522	Advanced Biological Cybernetics	2			Not offered for 2023	2				
Master	IMIS	0AL5524	Adaptive Systems	2	Sp+Ab	Tue,4		2				
Master	IMIS	0ALE001	Fundamentals of Mathematics in Intelligent and Mechanical Interaction Systems	2	Sp+Ab	Wed,4		2				
Master	IMIS	0ALE002	Fundamental Theory of Intelligent Interaction Systems	2	Sp+Ab	Thu,4		2				
Master	IMIS	0ALE003	Fundamental Mathematical System of Mechanical Interaction Systems	2	Sp+Ab	Wed,2		2				
Master	EME	0AL0602	Advanced Structural Mechanics	2	Sp+Ab	Wed,2		2				
Master	EME	0AL0624	Advanced Fluid Mechanics	3	Sp+ABC	Thu,2		3				
Master	EME	0AL0625	Advanced Fluid Mechanics 1 - 2023	2	Sp+Ab	Thu,2		2				
Master	EME	0AL0626	Advanced Fluid Mechanics 2 - 2023	1	Sp+Ab	Thu,2		1				
Master	EME	0AL5610	Computational Fluid Dynamics	2	Fa+Ab	Fri,4		2				
Master	EME	0AL5604	Advanced Computational Mechanics	2	Fa+Ab	Tue,4		2				
Master	EME	0AL5609	Advanced Reliability Engineering	2	Sp+Ab	Wed,4		2				
Doctor	R2E	0BDM229	Complex System Engineering	1	Fa+Ab	Sat,6		1				

1-2. Data science												
Doctor	R2E	0BDM224	Advanced Lectures of Information Retrieval	1	Sp+Ab	by appointment		1				
Doctor	R2E	0BDM225	Intellectual Document Control	1			Not offered for 2023	1				
Doctor	R2E	0BDM226	Information Management	1			Course before 2023	1				
Master	PPS	0AL0104	Statistical Analysis	2	Sp+Ab	Thu,6		2				
Master	PPS	0AL0105	Corporate Valuation	2	Sp+Ab	Fri,2		2				
Master	PPS	0AL0108	Spatial Information Science	2	Sp+Ab	Thu,4		2				
Master	PPS	0AL5105	Information Security	2	Fa+Ab	Tue,4		2				
Master	PPS	0AL5101	Urban and Regional Analysis	2	Fa+Ab	Fri,2		2				
Master	PPS	0AL5103	Theory and Practice of Economic Policy	2	Fa+Ab	Thu,6		2				
Master	PPS	0AL5114	Operations Management	2	Sp+Ab	Thu,4		2				
Master	PPS	0AL5115	Special Lecture on Policy and Planning Sciences I	2	Fa+Ab	Intensive		2				
Master	PPS	0AL5116	Special Lecture on Policy and Planning Sciences II	2	Fa+Ab	Intensive		2				
Master	PPS	0AL5117	Special Lecture on Policy and Planning Sciences III	1	Fa+Ab	Intensive		1				
Master	SE	0AL0202	Analysis of Service Satisfaction	1	Fa+Ab	Fri,6		1				
Master	SE	0AL5200	Special Lecture on Service Engineering I	1	Sp+Ab	Intensive		1				
Master	SE	0AL5202	Special Lecture on Service Engineering III	1	Sp+Ab	Intensive		1				
Master	SE	0ALB002	Big Data Analytics	2	Sp+Ab	Thu,6		2				
Master	SE	0ALB001	Regional Data Analysis	2	Sp+Ab	Tue,2		2				
Master	SE	0ALB000	Consumer Psychology	2	Sp+Ab	Mon,4		2				
Master	R2E	0AL0302	Advanced Course on Cryptography	2	Sp+Ab	Mon,2		2				
Master	R2E	0AL0303	Modern Information Theory	2	Sp+Ab	Tue,4		2				
Master	R2E	0AL5301	Advanced Course in Cyber Risk	1	Sp+Ab	Intensive		1				
Master	R2E	0AL5303	Essential Discussions on Security	1	Sp+Ab	Intensive		1				
Master	R2E	0AL5304	Advanced Course in Network Security	2	Sp+Ab	Intensive		2				
Master	R2E	0AL5312	Seminar in Resilient Urban Planning	2	Fa+Ab	Tue,4		2				
Master	R2E	0AL5314	Financial Risk Analysis	2	Fa+Ab	Fri,6		2				
Master	R2E	0AL5316	Advanced Course on Cyber Security	2	Fa+Ab	Intensive		2				
Master	CS	0AL5401	Advanced Course in Computer Graphics	2			Not offered for 2023	2				
Master	CS	0AL5404	Services and Data Privacy	1	Sp+Ab	Intensive		1				
Master	CS	0AL5405	Advanced System Programming	2	Fa+Ab	Mon,6		2				
Master	CS	0AL5408	Techniques for Mining Software Repositories	1	Sp+Ab	Intensive		1				
Master	CS	0AL5409	Data Engineering I	2	Fa+Ab	Tue,4		2				
Master	CS	0AL5410	Data Engineering II	2			Not offered for 2023	2				
Master	CS	0AL0402	Data Analysis	2	Fa+Ab	Mon,4		2				
Master	CS	0AL5411	Special Topics in Computer Human Interaction I	1	Sp+Ab	Mon,3		1				
Master	CS	0AL5412	Special Topics in Computer Human Interaction II	1	Fa+Ab	Fri,2		1				
Master	CS	0AL5413	Programming Environment	2	Fa+Ab	Thu,6		2				
Master	CS	0AL5414	Advanced Course in Programming Languages	1	Sp+Ab	Tue,2		1				
Master	CS	0AL5415	Advanced Course in Program Theory	1	Fa+Ab	Fri,6		1				
Master	CS	0AL5417	Image Recognition and Understanding	2	Fa+Ab	Tue,4		2				
Master	CS	0AL5421	Advanced Course in High Performance Computing	2	Fa+Ab	Wed,2		2				
Master	CS	0AL5424	Advanced Course in Signal and Image Processing I	1	Sp+Ab	Mon,6		1				
Master	CS	0AL5425	Advanced Course in Signal and Image Processing II	1	Sp+Ab	Mon,6		1				
Master	CS	0AL5426	Advanced Course in Signal and Image Processing III	1	Sp+Ab	Mon,6		1				
Master	CS	0AL5434	Concurrent Systems	2	Sp+Ab	Fri,4		2				
Master	CS	0AL5435	Advanced Parallel Processing Architecture	2			Not offered for 2023	2				
Master	CS	0AL5439	Special Lecture on Cryptography I	1	Sp+Ab	Mon,4		1				
Master	CS	0AL5440	Special Lecture on Cryptography II	1			Not offered for 2023	1				
Master	CS	0AL5443	Topics in Computer Ethics	2	Sp+Ab	Wed,4		2				
Master	CS	0AL5444	Topics in Computer Science I	1	Sp+Ab	Intensive		1				
Master	IMIS	0AL5501	Cybernetics	2			Not offered for 2023	2				
Master	IMIS	0AL5503	Smart Info-media System	2	Sp+Ab	Mon,6		2				
Master	IMIS	0AL5518	Information and Coding Theory	2	Fa+Ab	Tue,2		2				
Master	LSI	0AXA006	Introduction to Bioinformatics	1	Fa+Ab	Intensive		1				
Master	LSI	0AXA011	Basic Bioinformatics	1	Sp+Ab	Fri,2		1				
Master	LSI	0AXA891	Computational Biology	1			Not offered for 2023	1				
Master	LSI	0AXA892	Biomolecule and Medical Informatics	1	Sp+Ab	Intensive		1				
Master	LSI	0AXA893	Gene Analysis and Functional Genomics	1	Fa+Ab	Intensive		1				

1-3. Machine learning												
Doctor	R2E	0BDM005	Intelligent Systems	1			Not offered for 2023	1				
Doctor	R2E	0BDM223	Systems Design Theory	1			Not offered for 2023	1				
Master	R2E	0AL0300	Introduction to Soft Computing	2	Sp+Ab	Wed,4		2				
Master	R2E	0AL0301	Data Mining	2	Fa+Ab	Tue,6		2				
Master	CS	0AL5422	Computational Vision Science	1	Sp+Ab	Thu,1		1				
Master	CS	0AL5430	Adaptive Media Processing	1	Sp+Ab	Mon,2		1				
Master	CS	0AL5431	Advanced Course in Statistical Language Modeling	2	Fa+Ab	Tue,6		2				
Master	CS	0AL5437	Frontier Informatics A	1	Sp+Ab	Intensive		1				
Master	CS	0AL5438	Frontier Informatics B	1	Fa+Ab	Intensive		1				
Master	CS	0AL5441	Human-centered AI A	1	Sp+Ab	Intensive		1				
Master	CS	0AL5442	Human-centered AI B	1	Fa+Ab	Intensive		1				
Master	IMIS	0AL5512	Machine Learning	2	Fa+Ab	Fri,2		2				
Master	IMIS	0AL5514	Natural Language Processing and Information Access	2	Fa+Ab	Thu,4		2				
Master	IMIS	0AL5520	Artificial Intelligence	2	Sp+Ab	Mon,2		2				
Master	EMP	0AL5706	Basics of Machine Learning	2	Sp+Ab	Mon,2		2				
Master	EMP	0AL5707	Exercises of Machine Learning	1	Sp+Ab	Mon,2		1				
Master	SE	0ALB008	Management of Technology	2	Sp+Ab	Mon/Thu,6		2				
Master	IMIS	0ALE005	Tools and Practices for Intelligent Interaction Systems A	1	Sp+Ab	Mon,2		1				
Master	LSI	0AXA804	Applied Machine Learning	1	Fa+Ab	Fri,2		1				

2. Courses for fostering innovative creativity to realize interdisciplinary research by utilizing DS and AI												
2-1. Entrepreneur Exercise (Exercise related to entrepreneurship and business model development)												
Doctor	PPS	0BLA501	Facilitation Training Program in Policy and Planning Sciences I	2	Annual	by appointment		2	2			
Doctor	PPS	0BLA502	Facilitation Training Program in Policy and Planning Sciences II	2	Annual	by appointment		2	2			
Doctor	PPS	0BLA503	Facilitation Training Pre-Program in Policy and Planning Sciences III	1	Annual	by appointment		1	1			
Doctor	PPS	0BLA504	Facilitation Training Pre-Program in Policy and Planning Sciences IV	1	Annual	by appointment		1	1			
Doctor	EMP	0BLG511	Entrepreneurship Exercise	1	Sp+ABC	by request		1	1			
2-2. DS - AI Colloquium (interdisciplinary seminar with program faculty and enrolled students)												