

Toyama College		Year	2022		Course Title	Advanced Computational Engineering	
Course Information							
Course Code	0016			Course Category	Specialized / Elective		
Class Format	Lecture			Credits	Academic Credit: 2		
Department	Control Information Systems Engineering Course			Student Grade	Adv. 1st		
Term	Second Semester			Classes per Week	2		
Textbook and/or Teaching Materials	CG Simulation based on CIP method in Java						
Instructor	Furuyama Shoichi						
Course Objectives							
Rubric							
		Ideal Level of Achievement (Very Good)	Standard Level of Achievement (Good)		Unacceptable Level of Achievement (Fail)		
Advection Equation		Explanation for phenomena and difficulty of advection equation is explained.	Understanding of advection equation.		Lack of understanding of advection equation.		
Numerical Simulation for Advection Equation		Explaining of numerical diffusion and oscillation of advection equation and improved by CIP method.	Showing the numerical diffusion and oscillation.		Lack of understanding of simulation for advection equation.		
Application		Computational Fluid Dynamics (CFD) and Electro Magnetic Simulation (EMS) based on CIP method.	Some physics simulation based on CIP method.		Lack of understanding of numerical simulation.		
Assigned Department Objectives							
ディプロマポリシー B-3 JABEE B3							
Teaching Method							
Outline		To understand algorithms for derivative equations, differential equations, matrices. The programming techniques in C language and numerical simulation including a high speed calculation are studied.					
Style		Coding for numerical simulation is main task in each classes. The recognition of credit requires 60 points or more rating. If the final score is 60% or less, students can take ex-examination. The students whose score is more than 60% in ex-examination is 60%.					
Notice		Final examination (70%), Coding reports (30%)					
Characteristics of Class / Division in Learning							
☐ Active Learning		☐ Aided by ICT		☐ Applicable to Remote Class		☐ Instructor Professionally Experienced	
Course Plan							
			Theme		Goals		
2nd Semester r	3rd Quarter	1st	Guidance. Advection Equation.		Introduction for Advection Equation.		
		2nd	Descritization for Advection Equation		1st order method (Upwind scheme)		
		3rd	Descritization for Advection Equation		2nd order method (Lax-Wendroff method)		
		4th	Descritization for Advection Equation		CIP method		
		5th	Descritization for Advection Equation		Programming for CIP method		
		6th	Higher accuracy		Higher accuracy scheme for CIP method		
		7th	Higher accuracy		Programming of Higher accuracy scheme for CIP method.		
		8th	Multi Dimension		Two dimensional CIP method		
	4th Quarter	9th	Multi Dimension		Programming for two dimensional CIP method		
		10th	Application for physics		Electro Magnetic Simulation (EMS)		
		11th	Application for physics		Computational Fluid Dynamics (CFD)		
		12th	Application for physics		Programming for CFD		
		13th	High Performance Computing (HPC)		HPC for numerical simulation		
		14th	High Performance Computing (HPC)		GPGPU calculation		
		15th	Final Examination		Final Examination		
		16th	Checking the Final Evaluation		Checking the Final Evaluation		
Evaluation Method and Weight (%)							
	Examination	Presentation	Mutual Evaluations between students	Behavior	Portfolio	Other	Total
Subtotal	100	100	0	0	0	0	200
Basic Ability	40	40	0	0	0	0	80
Technical Ability	60	60	0	0	0	0	120

Interdisciplinary Ability	0	0	0	0	0	0	0
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