HAW Kiel
Hochschule für Angewandte Wissenschaften Kiel
Kiel University of Applied Sciences

AC++ - Advanced C++

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General information	
Module Code	AC++
Unique Identifier	AdvCPP-01-MA-M
Module Leader(s)	Prof. Dr. Manzke, Robert (robert.manzke@haw-kiel.de) Greve, Thomas (thomas.greve@haw-kiel.de)
Lecturer(s)	Greve, Thomas (thomas.greve@haw-kiel.de)
Offered in Semester	Sommersemester 2026
Module duration	1 Semester
Occurrence frequency	Regular
Module occurrence	In der Regel im Sommersemester
Language	Englisch
Recommended for international students	Yes
Can be attended with different study programme	Yes

Curricular relevance (according to examination regulations)
Study Subject: M.Sc. - MCS - Computer Science (PO 2023, V1) Module type: Wahlmodul Semester: 1, 2
Study Subject: M.Sc. - MIE - Information Engineering (PO 2022, V3) Module type: Wahlmodul Semester: 1, 2, 3

Qualification outcome
Areas of Competence: Knowledge and Understanding; Use, application and generation of knowledge; Communication and cooperation; Scientific self-understanding / professionalism.
Students will acquire/deepen the following competences: Technical: Students who successfully complete this course will have a general understanding of programming according to the standards C++11 and beyond. They will deepen their C++ skills by learning how - to avoid programing and coding errors - to make programming more economical by generating and using reusable code - to optimize their programs Social: Knowledge will be exercised by lab projects, which are carried out in teams. Results will be presented by the group. Personal: Students will be able to assess their own programming skills at the beginning of the course relative to its end. Due to the exposure to the vastness of C++(11) they will have a more realistic perspective on their own programming skills and what is missing to become an expert (specialization).

Content information	
Content	- Components being added to the language and the Standard-Library by the standards pursuing C++11. - Differences in programming: pre- vs. post-C++11 - Errorless code: Categories of typical (often made) mistakes, Tools to detect those (linter, sanitizers, setup of static tests) - Reusable code: Benefits and pitfalls of code-reuse, Differences between reusable and application-specific code, Static and dynamic libraries, Sources of existing libraries, Setting up of own libraries - Optimizing code: Optimization for space vs speed, Necessity of measurement; 80/20-rule, data structures, algorithms and code patterns which may benefit most, Tools for measurement (timers and profilers)
Literature	A Tour of C++, 3rd ed.; Bjarne Stroustrup; Addison Wesley; 978-0-13-681648-5 Effective C++-Series; Scott Meyers - Effective C++, 3rd ed.; 978-0-321-33487-9 - More Effective C++; 978-0-201-63371-9 - Effective Modern C++; 978-149-190399-5 - Effective STL; 978-0-201-74962-5 Optimized C++; Kurt Guntheroth; O'Reilly; 978-1-491-92206-4 API-Design for C++; Martin Reddy; Morgan Kaufmann; 978-0-12-385003-4 Secure Coding in C and C++; Robert C. Seacord; Addison-Wesley; 978-0-321-82213-0

Teaching formats of the courses	
Teaching format	**SWS**
Labor	2
Lehrvortrag	2

Workload	
Number of SWS	4 SWS
Credits	5,00 Credits
Contact hours	48 Hours
Self study	102 Hours

Module Examination	
Examination prerequisites according to exam regulations	None
AC++ - Klausur	Method of Examination: Klausur Duration: 120 Minutes Weighting: 100% wird angerechnet gem. § 11 Absatz 2 PVO: No Graded: Yes

Miscellaneous	
Recommended Prerequisites	Pre-requisites: Knowledge and practical experience of C++ and programming styles (procedural, object-oriented and generic).The level of module PIC) will be assumed.