

High Performance Computing and Parallel Programming: ACM40640/PH504

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Mr. Jake Williams (UCD)
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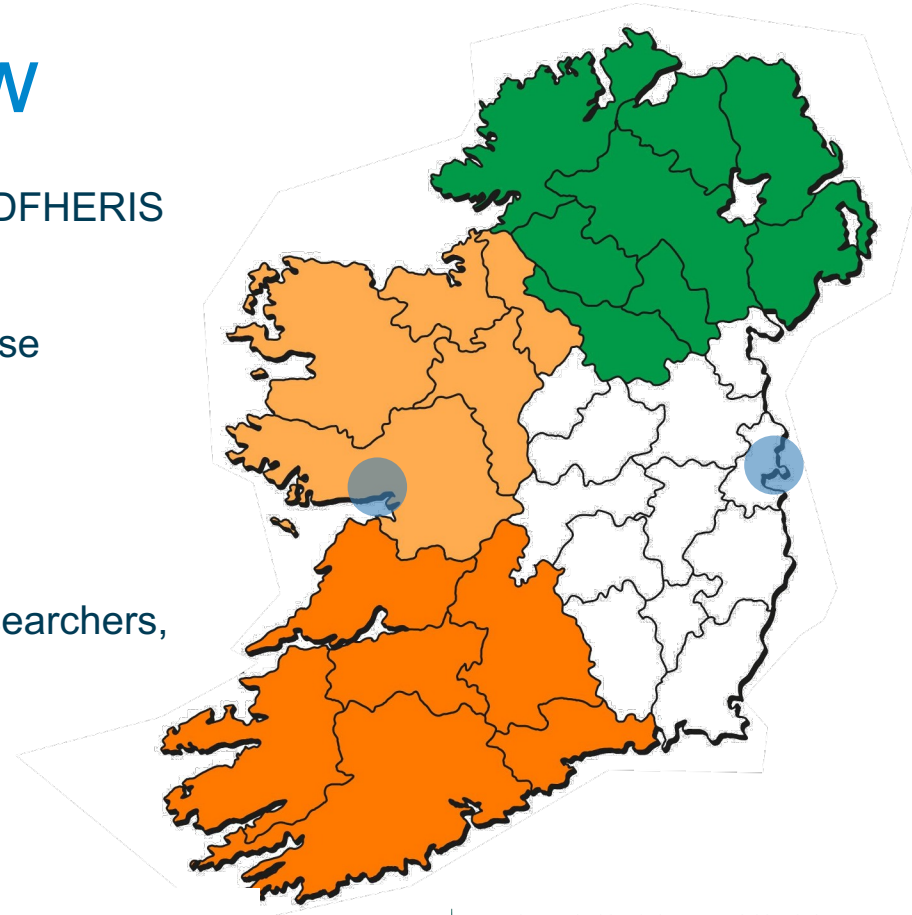
ICHEC overview

National HPC hosted by NUIG and funder by DFHERIS

Provides e-infrastructure, services and expertise

Academia, industry and public sector

Staff: sysadmins, computational scientists, researchers, etc.



OLLSCOIL NA GAILLIMHE
UNIVERSITY OF GALWAY



An Roinn Breisoideachais agus Ardoideachais,
Taighde, Nuálaíochta agus Eolaíochta
Department of Further and Higher Education,
Research, Innovation and Science

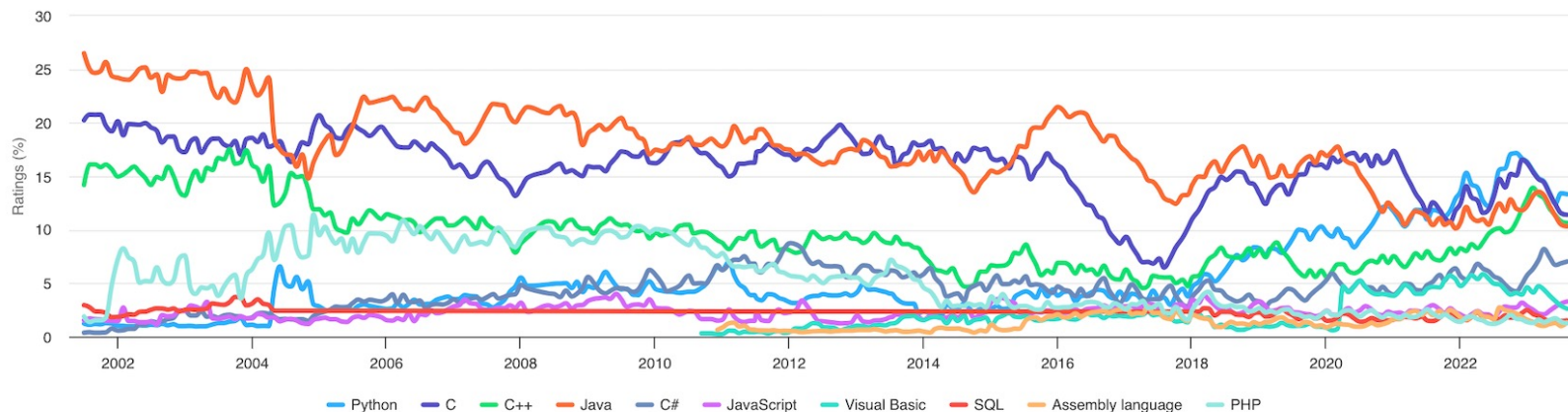
Course Overview

The goal is to gain understanding of different parallel programming paradigms as well as understanding different HPC architectures using best practice.

Use C or Fortran.

TIOBE Programming Community Index

Source: www.tiobe.com



C and Fortran are fast and well suited to HPC platforms.

Lectures and Practicals

Lectures:

The lectures are all video recorded. There are between **30-40 minutes of pre-recorded lecture materials** available each week, with accompanying pdfs

UCD students: Brightspace

University of Galway and Other Institutions: Canvas

You can watch these in your own time and there will be several to watch before the Q&A session.

Practicals and Q&A Sessions:

There will be a practical of the week to complete before the next week's Q&A sessions.

Q&A session: **Tuesday 11am-1pm** from **Zoom** covering the previous week's practical. The practicals will be covered in a live coding session, however if there are any other questions, please post them in the forums so we can answer/cover them.

216-ENG reserved for UCD students for the Q&A sessions.

Assessment

Assignments (70% total grade, 35% each)

There will be 2 assignments spread over the course, which need to be uploaded to Brightspace/Canvas. The normal rules governing plagiarism apply. Remember to comment your code!

Assignment 1: Tuesday 20th February → Tuesday March 19th

Assignment 2: Tuesday 26th March → Tuesday April 23rd

Exam (30% total grade)

Tuesday 30th April (3 hours to complete, 30 mins for uploading)

In person for UCD

Online for others

5 ECTS credits. External students need to confirm with their institution.

Week#	Tuesday Date	Q&A Session	Deadlines	Topic
1	23 rd Jan, 11am	Intro session		Introduction to HPC and HPC Architectures
2	30 th Jan, 11am	practical 1		Parallel Performance and Programming Models
3	6 th Feb, 11am	practical 2		Introduction to OpenMP
4	13 th Feb, 11am	practical 3		OpenMP Loop and Synchronisation Constructs
5	20 st Feb, 11am	practical 4	Assignment1 released	OpenMP versions after 2.5
<i>VIRTUAL OFFICE: 21st Feb Wednesday, 11am-12pm</i>				
6	27 th Feb, 11am	practical 5		Introduction to MPI
7	5 th Mar, 11am	practical 6		MPI Point to Point Communication
BREAK				
BREAK / 19th March Assignment1 due 5:30pm				
8	26 th Mar, 11am	practical 7	Assignment2 released	MPI Collective Communication
<i>VIRTUAL OFFICE: 27th Mar Wednesday, 11am-12pm</i>				
9	2 nd April,11am	practical 8		MPI Communicators and Virtual Topologies
10	9 th April, 11am	practical 9, 10		MPI Derived Datatypes
BREAK				
BREAK / 23rd April Assignment2 due 5:30pm				
	30 th April, 11am	FINAL EXAM		

Logging into sciprog

A successful login will appear as the following

Watch **How to SSH** recording for login information

Your passwords will not appear as you type

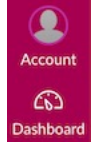
Ensure that your new password is longer than 20 characters

Usernames available in **Usernames.pdf** on Brightspace/Canvas

NB: Your assignments, exams will be marked on sciprog, so ensure that all submitted material is can be compiled and run on sciprog

```
Chris-MBP-5:~ chris$ ssh sp1@sciprog.ichec.ie
sp1@sciprog.ichec.ie's password:
You are required to change your password immediately (root enforced)
WARNING: Your password has expired.
You must change your password now and login again!
Changing password for user sp1.
Changing password for sp1.
(current) UNIX password:
New password:
BAD PASSWORD: The password is shorter than 20 characters
New password:
Retype new password:
passwd: all authentication tokens updated successfully.
Connection to sciprog.ichec.ie closed.
Chris-MBP-5:~ chris$
Chris-MBP-5:~ chris$
Chris-MBP-5:~ chris$ ssh sp1@sciprog.ichec.ie
sp1@sciprog.ichec.ie's password:
Last login: Fri Sep 25 14:45:23 2020 from glasnost.ichec.ie
[sp1@sciprog ~]$
```

Canvas view



≡ 2324-PH504

2023-2024

Home

Announcements

Syllabus

Modules

Discussions



Microsoft Teams meetings

Microsoft OneDrive

Grades

Chat

Recent announcements


-  **Zoom Details for Tuesday sessions**
Dear Class, There will be a live introduction to the module at 11a...
Posted on: 16 Jan 2024, 14:35
-  **Welcome to PH504 HPC and Parallel Programming**
Dear Class, The module will be starting on Monday January 22nd,...
Posted on: 15 Jan 2024, 09:16

Recent activity in 2324-PH504





No recent messages You don't have any messages to show in your stream yet. Once you begin participating in your courses, you'll see this stream fill up with messages from discussions, grading updates, private messages between you and other users, etc.

 View Course Calendar

 View Course Notifications

To do

-  [Welcome to PH504 HPC and Parallel Programming](#) ×
2324-PH504 High Performance Computing and Parallel Programming
15 Jan at 9:16
-  [Zoom Details for Tuesday sessions](#) ×
2324-PH504 High Performance Computing and Parallel Programming
16 Jan at 14:35

Canvas view



☰ 2324-PH504 > Modules

63 Student view



2023-2024

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Quizzes

Collaborations

Collapse all

View progress

✓ Publish All

+ Module



▼ Module Description



Module Description



▼ Information



Recommended References



Zoom Link




usernames_UniversityofGalway.pdf



▼ Recordings




Canvas view




2023-2024


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- Allv Course




Account




Dashboard




Courses




Calendar




Inbox




History




Studio




Commons







Help









▼ Week1







Videos








1-WhatisHPC.mp4







2-FundamentalsofComputerandHPCArchitectures.mp4








3-AboutKay.mp4








Slides









1- What is HPC?








2- Fundamentals of Computer and HPC Architectures








3- About Kay








Practical








practical1.pdf






hostname.c

hostname.f90

Brightspace view



ACM40640-High Performance Comp. (ICHEC)-202...



Buket Gursoy
as Student



My Learning Assessment ▾ Discussions My Class ▾ Library ▾ Module Tools ▾

ACM40640-High Performance Comp. (ICHEC)-2023/24 Spring

Calendar ▾

Friday, 19 January 2024



Upcoming events ▾

There are no events to display.

Welcome to the Module

Updates ▾

There are no current updates for
ACM40640-High Performance Comp.
(ICHEC)-2023/24 Spring

My Announcements ▾

[Zoom Details for Tuesday
sessions](#)



Module Descriptor ▾

Brightspace view



ACM40640-High Performance Comp. (ICHEC)-202...




Buket Gursoy



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 Overview

 Bookmarks

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Information ▾



Add dates and restrictions...




Add a description...

Upload/Create ▾

Existing Activities ▾

 Bulk Edit

 RecommendedReferences ▾

 PDF document




 Zoom Link ▾

 Link



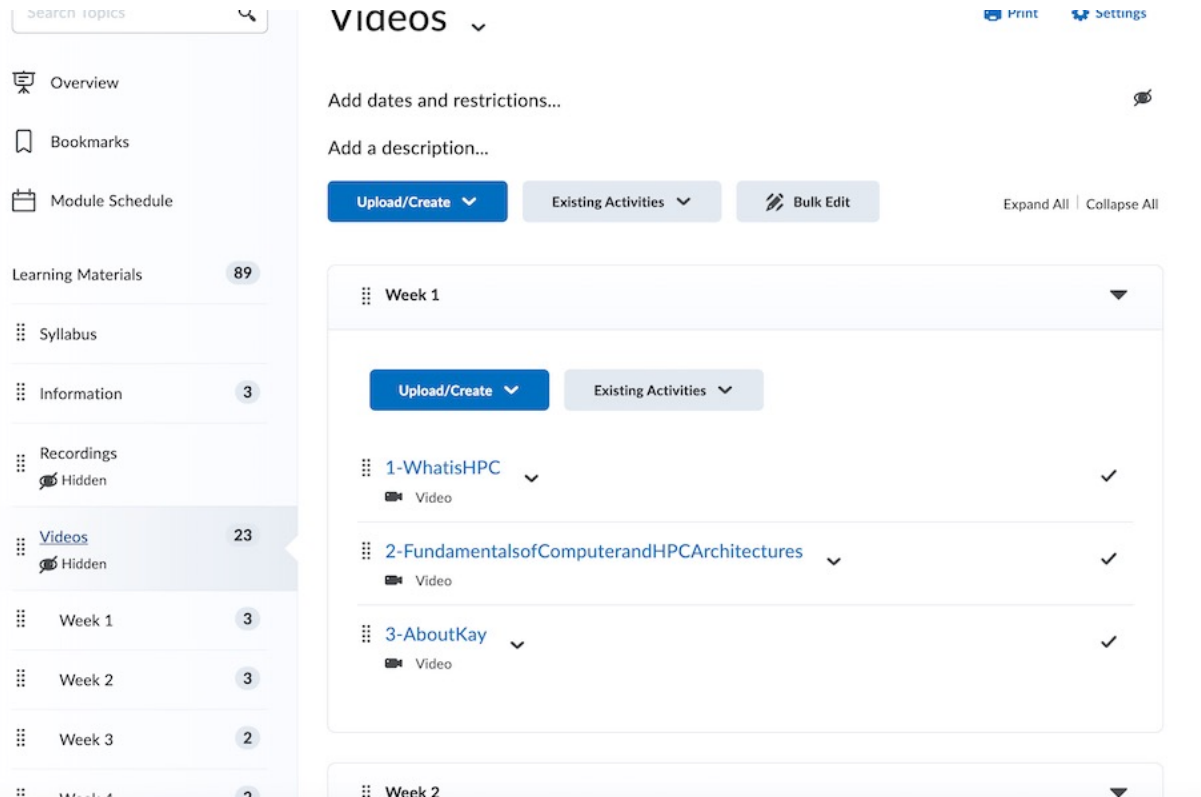
 usernames_UCD ▾

 PDF document



Add a sub-unit...

Brightspace view



The screenshot displays the Brightspace user interface. On the left is a navigation sidebar with a search bar and a list of items: Overview, Bookmarks, Module Schedule, Learning Materials (89 items), Syllabus, Information (3 items), Recordings (Hidden), Videos (23 items, Hidden), Week 1 (3 items), Week 2 (3 items), and Week 3 (2 items). The 'Videos' section is selected. The main content area is titled 'Videos' and includes options to 'Add dates and restrictions...', 'Add a description...', and buttons for 'Upload/Create', 'Existing Activities', and 'Bulk Edit'. It also features 'Expand All' and 'Collapse All' links. Below this, a 'Week 1' section contains three video entries: '1-WhatisHPC', '2-Fundamentals of Computer and HPC Architectures', and '3-About Kay', each with a 'Video' icon and a checkmark. A 'Week 2' section is partially visible at the bottom.

For any update/queries:

Announcements on Canvas/Brightspace

Discussion Forum on Canvas/Brightspace

Emails:

buket.gursoy@ichec.ie,

jake.williams@ucdconnect.ie

Links:

<https://universityofgalway.instructure.com/>

brightspace.ucd.ie

Zoom:

<https://universityofgalway-ie.zoom.us/j/97190591566?pwd=cUFhYjI2bINyU1dMY2ZiZmN0MXpWUT09>