

# ECE 7864: Advanced Computer Design

## Course Description

Parallel computer architectures, pipeline design, multiprocessor design, interprocessor communication, multi-core architectures, case studies and application examples.

**Prior Course Number:** 864, 694A

**Transcript Abbreviation:** Adv Comp Dsgn

**Grading Plan:** Letter Grade

**Course Deliveries:** Classroom

**Course Levels:** Graduate

**Student Ranks:** Masters, Doctoral

**Course Offerings:** Spring

**Flex Scheduled Course:** Never

**Course Frequency:** Odd Years

**Course Length:** 14 Week

**Credits:** 3.0

**Repeatable:** No

**Time Distribution:** 3.0 hr Lec

**Expected out-of-class hours per week:** 6.0

**Graded Component:** Lecture

**Credit by Examination:** No

**Admission Condition:** No

**Off Campus:** Never

**Campus Locations:** Columbus

**Prerequisites and Co-requisites:** Prereq: 5362 (662) or Grad standing.

**Exclusions:** Not open to students with credit for 864.

**Cross-Listings:**

**Course Rationale:** Existing course.

**The course is required for this unit's degrees, majors, and/or minors:** No

**The course is a GEC:** No

**The course is an elective (for this or other units) or is a service course for other units:** Yes

**Subject/CIP Code:** 14.0902

**Subsidy Level:** Doctoral Course

## Course Goals

Learn various techniques for designing high performance, advanced computer systems making use of parallelism.
Be trained in independent or team research and will recognize the need for life-long learning through a term project.
Improve communication skills through term paper presentations.

## Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Parallel computer models: MIMD, SIMD models	2.0							
Performance metrics and measures	2.0							
Program partitioning and scheduling	4.0							

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Static interconnection networks: characteristics, topologies, hypercubes, meshes, k-ary n-cubes	5.0							
Dynamic interconnection networks: shuffle-exchange, omega, butterfly, indirect hypercubes	5.0							
Parallel processing applications	4.0							
Vector processors, pipelining, arithmetic pipelines	4.0							
Shared memory organization	2.0							
Multi-core chips, architectures	3.0							
Example systems	3.0							
Embedded systems	2.0							

## Representative Assignments

Pencil & paper homework.
Computer problems.
Term paper projects: oral presentations and written reports.
Reviews of literature.

## Grades

Aspect	Percent
Midterm	25%
Quiz	10%
Homework	10%
Term paper	25%
Final	30%

## ABET-EAC Criterion 3 Outcomes

Course Contribution		College Outcome
***	a	An ability to apply knowledge of mathematics, science, and engineering.
*	b	An ability to design and conduct experiments, as well as to analyze and interpret data.
**	c	An ability to design a system, component, or process to meet desired needs.
*	d	An ability to function on multi-disciplinary teams.
*	e	An ability to identify, formulate, and solve engineering problems.
*	f	An understanding of professional and ethical responsibility.
*	g	An ability to communicate effectively.
*	h	The broad education necessary to understand the impact of engineering solutions in a global and societal context.
**	i	A recognition of the need for, and an ability to engage in life-long learning.
*	j	A knowledge of contemporary issues.
**	k	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

## Additional Notes or Comments

Updated prereqs, exclusions, goals and topics to match university format 3/20/12

Betty Lise,

ECE 7864 lists 5362 (or 662) as a prereq and grad students need my signature on a form to register. Is it possible to change it to "or graduate standing".

Also "not open ..... with credit for 863" should be " not open .....with credit for 864.  
10/30/12

**Prepared by:** Betty Lise Anderson