Program

4th Annual ICRC/IRTG Summer Workshop and Symposium On Composite Materials

June 17 – 21, 2019 and June 24 – 28, 2019 The University of Western Ontario

Western International Composites Research Centre (ICRC)

Weeks-at-a-Glance

2019 ICRC Short Courses

ICRC Short Courses are open to all ICRC/IRTG students and faculty and will be delivered at Western University. They may be taken for credit by Canadian graduate students and carry a weight of 0.25 credits, corresponding to 12-16 hours of instruction.

1. Characterization and Processing of Filled Polymers

(2 days: 9:00 am June 20 - 4:00 pm June 21)

Instructor: Prof. Michael Thompson, McMaster University

Suitable for students from all research areas, this course is designed to provide the essential background knowledge to appreciate the material properties that govern the processing of filled polymers and the tools and techniques applicable to characterizing these properties.

2. Mechanical Characterization of Anisotropic Materials

(2.5 days: 9:00 am June 17 - 4:00 pm June 18; 9:00am – 12:00pm June 19)

Instructors: Prof. Jeff Wood, Western University; Prof. Bill Altenhof, University of Windsor

Suitable for students from all research areas, this course is designed to impart a fundamental understanding of the material properties required to characterize the mechanical behavior of anisotropic materials and hands-on experience in the collection and analysis of mechanical test data.

2019 ICRC/IRTG Composites Workshop

	Mon. 6/24	Tues. 6/25	Wed. 6/26	Thurs. 6/27	Fri. 6/28
		Meetings and Poster Session	**Technical Program I**	**Technical Program II**	**Social Tours**
Morning		ICRC/IRTG Mtgs - Research Ctte Academic Ctte - Self-organized research mtgs	Welcoming remarks Processing/ Technology	Simulation	Niagara Falls Or Toronto
Lunch			Essex Hall	Essex Hall	
Afternoon	WindEEE Research Institute Fraunhofer Project Centre Beertown Public House	Canadian HQP Meeting Self-organized research mtgs Poster Session, Reception & Bar ACEB Atrium	Design	Materials	
Dinner			Workshop Banquet The Mercato – Brescia College		

Monday June 24, 2019

Technical Tours

1215	Congregate in front of Spencer Engineering Building (SEB) Lambton Drive Entrance	
1230	Depart Spencer Engineering Building (SEB)	
1300	Arrive WindEEE Research Institute	
1300 -1430	Tour WndEEE Facility	
1435	Depart WindEEE Research Institute	
1440	Arrive Fraunhofer Project Centre	
1445 -1545	Tour of Fraunhofer Project Centre	
1550	Depart Fraunhofer Project Centre	
1630	Arrive Beertown Public House (109 Fanshawe Park Rd. E.) Or return to Ontario Hall	

Tuesday June 25, 2019

Research Meetings and Poster Session

10:00 – 11:30	ICRC Faculty Meeting (ACEB 1410)	Unscheduled time for self-organized research meetings
13:00	Canadian HQP Meeting (ACEB 1410)	
15:00 - 17:30	Poster Session and Reception ACEB Atrium	

Simulation

Micro-Mechanical Modeling Compound Composites based on Generated Unit Cells. ***Johannes Görthofer***
Phase-Field Modeling of Residual Stress Evolution during the Process of Fibre-Reinforced Polymers. ***Lukas Schoeller***
The Journey of a Single Polymer Chain to a Nanopore. ***Navid Afrasiabian***
Modelling of Resin Infiltration and Curing in Carbon Fiber Reinforced Plastic Components. ***Rex Sherratt***
Fracture and Damage Mechanics. ***Julian Bauer***
Mean-Field Modeling and Characterization, ***Juliane Lang***

Processing/Technology

Material and Process Development of Polyurethane based SMC for Improved Impact Strength. ***Sergej Ilinzeer***
Post-processing of CoDiCoFRP. ***Jannis Langer***
T3: Data Fusion for Quality Assurance. ***Lucas Bretz***
Toolless Forming Process for Producing Load-Adapted UD Reinforcements. ***Daniel Kupzik***

Design

Modelling a Prototype's System of Objectives: A Supporting Systematic Approach. ***Thilo Richter***
D1 - Process Simulation and Process-Oriented Optimization. ***Nils Meyer***
D2: Topological Optimization. ***Sven Revfi***
Machine Learning Methods Predicting Optimal Mechanical Properties of Carbon Fibre/Polyamide-6 Long Thermoplastics. ***Jennifer Sears***

Materials

Microstructure Characterization of Sheet Molding Compounds. ***Ludwig Schöttl***
C1: Mechanics of interfaces. ***Benedikt Rohrmüller***
Fatigue damage Characterization of Continuous-Discontinuous Sheet Molding Compounds. ***Miriam Bartkowiak***
Energy absorption mechanisms in non-crimp fabric CFRPs. ***Aaditya Suratkar***

Wednesday June 26, 2019

Technical Program 1

0900	Arrival and Coffee/Tea	ACEB 1410
0930	Welcoming Remarks • **Jeff Wood** • **Thomas Böhlke**	
1000	**Technical Session I – Processing/Technology** (Chair: M. Thompson)	
1000	**Daniel Kupzik** *Kinematic Description and Shape Optimization of UD-Tape Reinforcements Manufactured with a Novel Preforming Process*	
1030	**Jannis Langer** *Post-Processing of CoDiCoFRP*	
1100	Coffee Refresh	
1115	**Lucas Bretz** *Function-Oriented Measurement of CoDiCoFRPs*	
1145	**Sergej Ilinzeer** *Material and Process Development of Polyurethane based SMC for Improved Impact Strength*.	
1230	Lunch	Essex Hall Cafeteria
1330	**Technical Session II – Design** (Chair: J Wood)	ACEB 1410
1330	**Nils Meyer** *Direct Bundle Simulation of SMC Compression Molding*	
1400	**Sven Revfi** *Manufacturing-Oriented Bead Patterns for Long Fiber-Reinforced Polymer Structures*	
1430	Coffee Refresh	
1445	**Thilo Richter** *Modelling a Prototype's System of Objectives: A Supporting Systematic Approach*	
1515	**Jennifer Sears** *Machine Learning Methods Predicting Optimal Mechanical Properties of Carbon Fibre/Polyamide-6 Long Fibre Thermoplastics*	
1800 1900	**Conference Banquet** Cocktails and Appetizers Dinner	Brescia College Mercato I

Thursday June 27, 2019

Technical Program 2

0900	Arrival and Coffee/Tea	ACEB 1410
0930	Key note speaker • **Greg Delbridge,** *Altair Canada*	
1015	**Technical Session III – Simulation** (Chair: W. Altenhof)	
1015	**Lukas Schoeller** *Phase-Field Modeling of Residual Stress Evolution during the Curing Process of Fibre-Reinforced Polymers*	
1045	**Johannes Görthofer** *Computational Homogenization of Sheet Molding Compound Composites based on Generated Unit Cells*	
1115	Coffee Refresh	
1130	**Rex Sherratt** *Modelling of Resin Infiltration and Curing in Carbon Fiber Reinforced Plastic Components*	
1200	**Juliane Lang** *Biaxial damage investigations of SMC*	
1230	Lunch	Essex Hall Cafeteria
1330	**Technical Session IV – Materials** (Chair: J Wood)	ACEB 1410
1330	**Aaditya Suratkar** *Damage evolution in non-crimp fabric CFRPs under tensile loading*.	
1400	**Ludwig Schöttle** *Microstructure Characterization of Sheet Molding Compound*	
1430	Coffee Refresh	
1445	**Benedikt Rohrmüller** *Characterization of Fiber Matrix Interface of Discontinuous Fiber Reinforced Polymers on the Microscale*	
1515	**Miriam Bartkowiak** *Fatigue Damage Characterization of Continuous-Discontinuous Sheet Molding Compounds*	
1545	Closing Remarks	

Friday June 28, 2019

Social Program

Niagara Falls

For those who have already signed up, we have arranged bus transportation to Niagara Falls.

- Congregate at 8:20 am at Ontario Hall Parking Lot.
- Departure 8:30 am from Ontario Hall.
- Departure from Niagara Falls at 1700hrs
- Return approximately 1900hrs

In addition to sightseeing, there are a wide variety of activities to be enjoyed in and around Niagara Falls. Visit https://www.niagarafallstourism.com to start planning your day.
These attractions come highly recommended:

- Whirlpool Jet Boats (you ***will*** get wet): http://www.whirlpooljet.com
- Niagara Cruises (*formerly Maid of the Mist*): https://www.niagaracruises.com
- Journey behind the Falls:https://www.niagaraparks.com/visit/attractions/journey-behind-the falls/

Toronto

Some people indicated a desire to visit Toronto. The simplest approach is to take the train from London to Toronto (Union Station). This puts you two blocks from the waterfront in the heart of downtown.

- Trains leave London/arrive in Toronto at:
    - 06:25/08:35, 07:30/10:04, 07:32/10:53 and 11:02/13:11
- Trains leave Toronto/arrive in London:
    - 16:35/18:49, 17:30/19:55, 17:40/21:09,19:35/21:45
- Reservations (starting at $90 return) can be made online at www.viarail.ca

Participants

Keynote Speaker

Mr. Greg Delbridge, *Altair Canada*

Greg Delbridge has been with Altair Engineering for the past 11 years in the role of Senior Application

Engineer and now as a Technical Manager. He provides mentorship and advice to the users of the HyperWorks Suite of software. Prior to Altair, he was a structural engineer for MDA Space Missions and an engineering consulting company. He has worked on projects for the Phoenix Mars Lander and Space Station, and many simulation projects ranging from the design of a safer lens retention edge for safety glasses, to the assessment of the flight deck of Canada's frigates for the landing of new maritime helicopters.

He holds a Master of Engineering from the University of Toronto and a Bachelor's in Mechanical Engineering from the Technical University of Nova Scotia.

Abstract

This presentation will introduce the audience to Altair and its flagship product HyperWorks. Altair HyperWork is the most comprehensive open-architecture simulation platform, offering best-in-class technologies to design and optimize high performance, efficient and innovative products. Various aspects of HyperWorks, related to composite modeling and analyses, will be presented including:

The development of continuous long fiber finite element models using HyperMesh and its novel approach to ply-based FE model development. In addition to modelling, HyperMesh has many additional capabilities available for composite model definition, such as automatic material orientation and draping determination.

Optistructs comprehensive optimization solution aimed at guiding and simplifying the design of laminate composite structures. This integrated three-phase process of ply shape, ply thickness and finally stacking sequence determination, guides the design from concept to completion. Allowing designers and engineers to quickly develop a lightweight, structurally efficient detailed composite design that will meet performance and safety specifications.

Development of multiscale material models and simulation of parts manufactured from any heterogeneous material, such as continuous and chopped fiber composites, accurately and efficiently using Altair's Multiscale Designer tool. Multiscale Designer is used for applications such as multiscale material modeling for design, ultimate failure assessment, and development of material allowable.

Participants

Scientist and Institutions

Canada

The University of Western Ontario

Prof. Jeffrey Wood, *Mechanical and Materials Engineering*

Prof. Andrew Hrymak, *Chemical and Biochemical Engineering*

Prof. Takashi Kuboki, *Mechanical and Materials Engineering*

Prof. Darren Meister, *Engineering Leadership and Innovation*

Prof. Remus O. Tutunea-Fatan, *Mechanical and Materials Engineering*

Prof. Colin Denniston, *Applied Mathematics, Physics and Astronomy*

University of Windsor

Prof. William Altenhof, Mechanical, *Automotive and Materials Engineering*

Prof. Jennifer Johrendt, Mechanical, *Automotive and Materials Engineering*

Prof. Bruce Minaker, Mechanical, *Automotive and Materials Engineering*

McMaster University

Prof. Michael Thompson, *Chemical Engineering*

University of Waterloo

Prof. Kaan Inal, *Mechanical and Mechatronics Engineering*

Prof. John Montesano, *Mechanical and Mechatronics Engineering*

Germany

Prof. Dr.-Ing. Thomas Böhlke*, Institut für Technische Mechanik (Engineering Mechanics)*
Prof. Dr.-Ing. Dr. h. c. Albert Albers, *Institut für Produktentwicklung (Product Engineering)*
Prof. Dr.-Ing. Frank Henning, *Institut für Fahrzeugsystemtechnik (Vehicle System Technology), Fraunhofer Institut für Chemische Technologie (Chemical Technology)*
Prof. Dr.-Ing. Jörg Hohe, *Institut für Angewandte Materialien Computation Materials Science, Fraunhofer Institut für Werkstoffmechanik (Mechanics of Materials)*
Prof. Dr.-Ing. Luise kärger, *Institut für Fahrzeugsystemtechnik (Vehicle System Technology)*

Participants

Speakers

Aaditya Suratkar, *University of Western Ontario*

Johannes Görthofer, *Karlsruhe Institute of Technology*

Nils Meyer, *Karlsruhe Institute of Technology*

Ludwig Schöttl, *Karlsruhe Institute of Technology*

Sven Revfi, *Karlsruhe Institute of Technology*

Daniel Kupzik, *Karlsruhe Institute of Technology*

Rex Sherratt, *University of Western Ontario*

Thilo Richter, *Karlsruhe Institute of Technology*

Lukas Schoeller, *Karlsruhe Institute of Technology*

Jannis Langer, *Karlsruhe Institute of Technology*

Benedikt Rohrmüller, *Karlsruhe Institute of Technology*

Lucas Bretz, *Karlsruhe Institute of Technology*

Miriam Bartkowiak, *Karlsruhe Institute of Technology*

Jennifer Sears, *University of Windsor*

Juliane Lang, *Karlsruhe Institute of Technology*

Participants

Poster Presenters

Navid Afrasiabian, *University of Western Ontario*

Sergej Ilinzeer, Fraunhofer ICT

Johannes Görthofer, *Karlsruhe Institute of Technology*

Nils Meyer, *Karlsruhe Institute of Technology*

Ludwig Schöttl, *Karlsruhe Institute of Technology*

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Jennifer Sears, *University of Windsor*

Rex Sherratt, *University of Western Ontario*

Julian Bauer, *Karlsruhe Institute of Technology*

Juliane Lang, *Karlsruhe Institute of Technology*

Aaditya Suratkar, *University of Western Ontario*

Attendees

Theogenes de Oliver Maia, *University of Western Ontario*

Broderick Clement-Thorne, *University of Western Ontario*

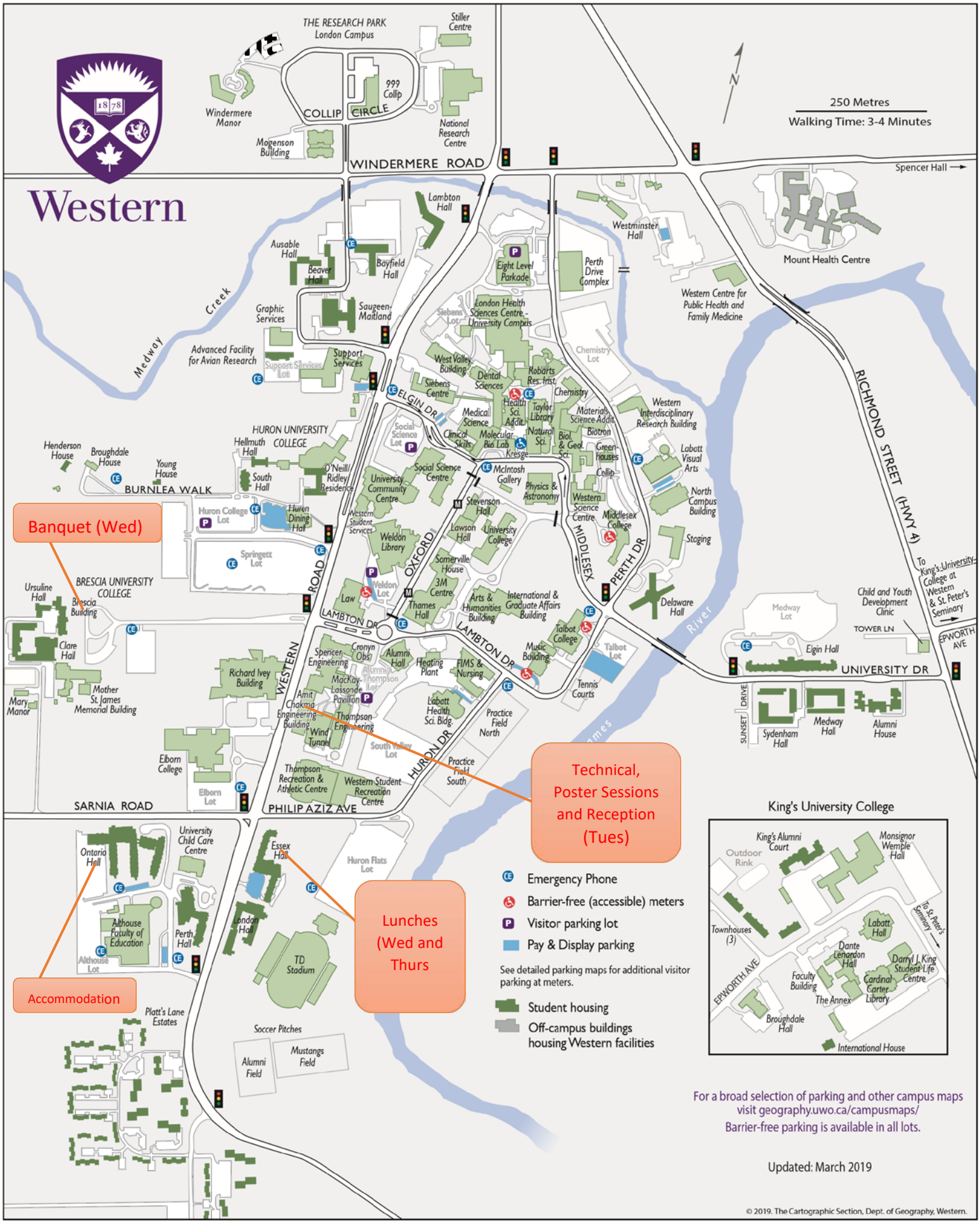
Austin Bedrosian, *McMaster University*

Eric Martin, *University of Western Ontario*

Morteza Alebooyeh, *University of Windsor*

David Knezevic, *University of Western Ontario*

Cheng Xu, *University of Western Ontario*


Western
THE RESEARCH PARK
London Campus
Stiller Centre
Windermere Manor
COLLIP CIRCLE
999 Collip
National Research Centre
Mogenson Building
WINDERMERE ROAD
N
250 Metres
Walking Time: 3-4 Minutes
Spencer Hall
Lambton Hall
Ausable Hall
Beaver Hall
Bayfield Hall
Eight Level Parkade
Westminster Hall
Perth Drive Complex
Mount Health Centre
Western Centre for Public Health and Family Medicine
Medway Creek
Graphic Services
Saugeen-Maitland
Advanced Facility for Avian Research
Support Services
Support Services Lot
London Health Sciences Centre - University Campus
Siebens Lot
Chemistry Lot
West Valley Building
Dental Sciences
Robarts Res. Inst.
Siebens Centre
Health Sci. Addit
Chemistry
Taylor Library
Materials Science Addit.
Western Interdisciplinary Research Building
Medical Science
Clinical Skills
Molecular Bio Lab
Krieger
Natural Sci.
Biol. & Geol Sci.
Biotron
Green-houses
Collip
Labatt Visual Arts
RICHMOND STREET (HWY 4)
ELGIN DR
Social Science Lot
HURON UNIVERSITY COLLEGE
Hellmuth Hall
Henderson House
Broughdale House
Young House
BURNLEA WALK
South Hall
O'Neill/Ridley Residence
Social Science Centre
McIntosh Gallery
Physics & Astronomy
Western Science Centre
Middlesex College
North Campus Building
Staging
Huron College Lot
Huron Dining Hall
University Community Centre
Western Student Services
Stevenson Hall
Lawson Hall
University College
Weldon Library
Somerville House
3M Centre
Thames Hall
Law
Weldon Lot
OXFORD ROAD
MIDDLESEX
PERTH DR
Springett Lot
BRESCIA UNIVERSITY COLLEGE
Ursuline Hall
Brescia Building
Clare Hall
Mother St. James Memorial Building
Mary Manor
LAMBTON DR
Arts & Humanities Building
International & Graduate Affairs Building
Talbot College
Talbot Lot
Delaware Hall
Child and Youth Development Clinic
To King's-University College at Western & St. Peter's Seminary
TOWER LN
EPWORTH AVE
Medway Lot
Elgin Hall
UNIVERSITY DR
River
Richard Ivey Building
WESTERN
Spencer Engineering
Cronyn Obs.
Alumni Hall
Heating Plant
FIMS & Nursing
Music Building
Tennis Courts
MacKay-Lassonde Pavilion
Alumni-Thompson Lot
Amit Chakma Engineering Building
Thompson Engineering
Wind Tunnel
Labatt Health Sci. Bldg.
Practice Field North
Practice Field South
South Valley Lot
HURON DR
SUNSET DRIVE
Sydenham Hall
Medway Hall
Alumni House
Elborn College
Elborn Lot
Thompson Recreation & Athletic Centre
Western Student Recreation Centre
SARNIA ROAD
PHILIP AZIZ AVE
Banquet (Wed)
Technical, Poster Sessions and Reception (Tues)
Lunches (Wed and Thurs)
Accommodation
University Child Care Centre
Ontario Hall
Essex Hall
Huron Flats Lot
Althouse Faculty of Education
Althouse Lot
Perth Hall
London Hall
TD Stadium
Platt's Lane Estates
Soccer Pitches
Alumni Field
Mustangs Field
Emergency Phone
Barrier-free (accessible) meters
Visitor parking lot
Pay & Display parking
See detailed parking maps for additional visitor parking at meters.
Student housing
Off-campus buildings housing Western facilities
King's University College
King's Alumni Court
Monsignor Wemple Hall
Outdoor Rink
Townhouses (3)
Labatt Hall
To St. Peter's Seminary
Dante Lenardon Hall
Darryl J. King Student Life Centre
Faculty Building
Cardinal Carter Library
The Annex
Broughdale Hall
International House
For a broad selection of parking and other campus maps visit geography.uwo.ca/campusmaps/
Barrier-free parking is available in all lots.
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