

# UNDAEROSPACE

UNIVERSITY OF NORTH DAKOTA

*Briefing Paper*

## **UNIVERSITY OF NORTH DAKOTA**

- largest state-supported institution of higher education in the Upper Midwest (located in Grand Forks, North Dakota)
- established in 1883 and is six years older than the state
- offers academic programs in over 180 programs of study including undergraduate, masters, and doctoral degree programs
- accredited post-graduate professional schools of law and medicine
- undergraduate enrollment approximately 10,500 students, 2,000 graduate/professional school enrollment, total enrollment of approximately 12,500
- full-time faculty and research staff numbers 809 and a total full-time work force of 2,768 employees
- accredited by the North Central Association of Colleges and Universities

## **JOHN D. ODEGARD SCHOOL OF AEROSPACE SCIENCES (UND AEROSPACE)**

- international leader in aviation education and flight training (fixed wing and helicopter)
- aviation student majors total 1,870 students
- houses five academic departments: Aviation, Atmospheric Sciences, Computer Science, Earth System Sciences and Policy, and Space Studies
- offers 12 degree programs including four master's degree programs and two doctorate degrees
- faculty of over 120 including 37 with Ph.D. degrees, 20 with M.S./M.A. degrees; employees total over 800 (includes 200+ flight instructors)
- modern aerospace complex dedicated to integrating government, industry and education

## **HISTORICAL**

- program started with 12 students and two donated aircraft
- founded as Department of Aviation within UND's College of Business (1968)
- renamed Center for Aerospace Sciences (1982), granted full status as a college 1983, renamed John D. Odegard School of Aerospace Sciences in 1998
- nation's first aviation degree program combined with an accredited undergraduate business degree
- established nation's first hands-on ATC tower training with FAA tower chief supervision for college-level students (1971)
- Dean John Odegard chaired curriculum committee which developed FAA's airway science degree
- among the first schools to implement the FAA airway science degree in 1982
- All-American football alum Bruce A. Smith from Delta Airlines named dean of UND Aerospace in January, 2000

## Degree Programs

- **Aviation** – Three undergraduate degrees, one minor and one masters degree designed to prepare top caliber aerospace industry professionals for variety of careers in government and industry; curricula accredited by the Aviation Accreditation Board International (AABI) and frequently serve as models for startup programs at other universities
  - Master of Science in Aviation (M.S.) – emphasis on various fields within the industry, ranging from the airlines to corporate aviation, general aviation to airport and aviation management
  - Aviation Management (B.B.A.) – emphasis on preparing for piloting career and airside-related management (degree granted by College of Business and Public Administration)
  - Airport Management (B.B.A.) – emphasis on preparing for administrative positions related to groundside management (degree granted by College of Business and Public Administration)
  - Aeronautics (B.S.) – emphasis on liberal arts preparation for piloting, air traffic control, or aviation education careers – four majors:
    - Commercial Aviation
    - Air Traffic Control Operations
    - Aviation Systems Management
    - Flight Education
- **Atmospheric Sciences** – offers B.S., M.S., and Ph.D. degrees (and undergraduate minor); designed to prepare graduates for positions in applied meteorology and research; widely-respected within scientific circle for lab-intensive curriculum; includes polarimetric Doppler radar meteorology; developed in 1980 as outgrowth of strong atmospheric research program; masters degree program began in Fall 1998, Ph.D. in Fall 2006
- **Computer Science** – offers B.S. and M.S. degree (and undergraduate minor); designed to provide professional education for careers in business, science, government and industry; one of about 160 computer science programs accredited by Computer Science Accreditation Board, Inc.
- **Earth System Sciences and Policy** – offers M.S. and Ph.D. degrees; provides an integrated and creative learning environment that fosters intellectual growth, critical thinking and practical engagement in research and management of the Earth system and resources. ESSP's objective is sustainability; the practice of meeting human needs and values while preserving Earth's vital ecosystem services
- **Space Studies** – offers M.S. (and undergraduate minor); provides students with introduction to the variety of space projects and issues that will affect their lifestyles and careers in coming decades; the nation's first interdisciplinary Master's degree; offers degree to traditional students on campus and to distant learners via videotape and the internet (105 majors)
- **Future Degree Programs** (under development) – M.B.A. Aviation Administration; Ph.D. Computer Science; Ph.D. Space Studies; M.S. Instructional Technology Design

## COLLEGIATE PARTNERSHIPS

- with University of Minnesota-Crookston to provide primary flight instruction to UMC Agricultural Aviation students at the Crookston Municipal Airport
- with Chandler-Gilbert Community College, Chandler, Arizona to provide flight courses for credit in cooperation with CGCC and Maricopa County Community Colleges. Academic articulation agreements with these schools facilitates transfer process from community college to UND.
- with Spokane Falls (Washington) Community College to provide flight courses for credit in cooperation with SFCC. Academic articulation agreements with these schools facilitates transfer process from community college to UND.
- with Williston (North Dakota) State College to provide flight courses for credit in cooperation with WSC. Academic articulation agreements with these schools facilitates transfer process from community college to UND.
- with Robeson Community College, (Lumberton, North Carolina) to provide the first two years of

academic coursework and commercial pilot training/certification. Academic articulation agreements with these schools facilitates transfer process from community college to UND.

- with Thief River Falls Technical College and Northland Community College respectively (Thief River Falls, Minnesota) to support airway science maintenance major

#### **Flight Training (all sites, including Grand Forks)**

- FAA FAR Part 141 approved flight school
- operational statistics – +100,000 flight training hours per year
- 1000+ collegiate flight students enrolled
- 230+ flight instructors and 45 maintenance and line personnel
- fully-integrated with academic instruction – certificates/ratings:
  - private (airplane, rotorcraft)
  - instrument (airplane, rotorcraft)
  - CFI (airplane, rotorcraft)
  - MEI
  - ATP (single-engine, multi-engine, rotorcraft)
  - commercial (airplane, rotorcraft)
  - single-engine seaplane
  - CFII (airplane, rotorcraft)
  - aerobatic and tailwheel training
- one of the world's largest collegiate flight training fleets incorporating modern "glass cockpit" Piper Warriors, Seminole, and Cirrus Design SR-20s
- fleet of over 100 aircraft (includes jet aircraft, piston-powered and turbine-powered helicopters) and 15 flight simulators
- all aircraft equipped with extra safety devices including Mode-C altitude encoders, recognition lights, ELTs, and survival kits, some with ADS-B
- FAA Level 6 certified CRJ-200 regional jet Flight Training Device (FTD) for training pilots in a modern, glass-cockpit regional jet – provides type-rated pilots with approximately 65% of the training credits as defined in the Practical Test Standards
- West Point helicopter pilot training program under agreement with U. S. Army Aviation and ROTC scholarship program
- flight environment – fully-instrumented airport with parallel runways; modern 90-foot ATC facility on-site; approach control by Grand Forks Air Force Base (15 miles to the west), 12 satellite airports within 40 miles available for VFR and IFR operations, fourth and fifth runways scheduled to be built in 2008
- random drug testing of employees and students involved in flight training

#### **CURRENT AVIATION RESEARCH**

- human factors – awarded FAA grant to lead nationwide study of human factors affecting aircrew performance; recommendations expected to form basis for establishing new pilot training standards for 21st century
- psychological testing – initiated and conducting ongoing project to determine how personality and communication styles of student pilot and flight instructor enhance or impede training process
- remote airport runway lighting – a project designed to help remote communities solve the problem of lighting their runways while dealing with social and economical factors.
- accurate in-flight traffic, weather, and terrain information – installed ADS-B equipment in UND's fixed-wing fleet to improve overall system safety and efficiency
- unmanned aircraft systems – research development, testing and demonstration of payload and sensor systems for small UAS platforms

## STUDENT OPPORTUNITIES

- scholarships – over \$200,000+ in scholarships awarded annually to 100 students; supported by industry and alumni
- cooperative education – place students in “training with industry” internships across country
- weather modification pilot training – conducted since 1974 to provide training and flight experience for 9-12 aviation majors annually
- student organizations – 22 student organizations including the first officially-recognized student chapter of AAAE
- flying team – national NIFA champions 14 of the past 22 years
- two national, award-winning International Aerospace Camps serving ages 16-17
- the UND Aerobatics Flying Team competes in three competitions throughout the year; competitors fly a sequence of aerobatic maneuvers while being scored by a group of judges from the International Aerobatics Club

## CAMPUS FACILITIES

- aerospace complex of six buildings (five education and one hotel) on western edge of 570-acre campus; totaling more than 260,000 square feet; all buildings in the complex connected by skywalks.
- **Odegard Hall** – funded with \$2 million airway science grant; opened in August 1984; 56,000 square feet; houses modern classrooms and laboratories for aviation education; base of academic program administration and cornerstone of rapidly-developing aerospace complex – specialized facilities include:
  - Altitude Chamber – the only civilian-operated hypobaric chamber used for training purposes; donated by U. S. Air Force for aviation physiology training program; Refurbished by the UND Aerospace Foundation
  - Regional Weather Information Center – 24-hour monitoring of worldwide surface and upper atmospheric data used in FAA-funded research; forecast center with on-site, real-time weather instrumentation for use in daily weather forecasting; broadcast studios for daily weather segments on the North Dakota Public TV and radio; the success of RWIC’s Advanced Transportation Weather Information System (ATWIS) resulted in it becoming the template for the Federal Highway Administration’s new national ‘511’ traveler information system
  - Atmospherium – planetarium and multi-media theater-style auditorium; used as night vision trainer in aviation physiology training; used as interactive video classroom
- **Streibel Hall** – funded with \$2 million airway science grant; opened in 1986; total of 26,871 square feet; houses classrooms and labs for computer science; student access to variety of mainframe and pc-based systems
- **Ryan Hall** – built jointly with Northwest Aerospace Training Company (NATCO); opened in 1988; total of 63,112 square feet; houses classrooms, Aerospace Network distance learning television production facilities, and labs for flight training and air traffic control training – specialized facilities:
  - Flight Simulator Lab – 10 fixed-base simulators with high resolution color visuals (four SEL Ftd, four MEL ftd, one CRJ Ftd, one HUU Ftd) – all multi-crew simulators (specifications to simulate training fleet aircraft) including FAA Level 3 certified devices
  - Frasca Helicopter FTD – specially designed helicopter FTD with three channel display and ground illumination to simulate both the Bell 206 Jet Ranger and the Schweizer 300C (Hughes 300) helicopters used at JDOSAS.

- Level 6 Canadair Regional Jet (CRJ-200) simulator – Provides transition from light twin aircraft to modern and sophisticated glass-cockpit regional jets aviation students will be flying in the near future; Airlines have found that students who have taken this course are very successful during intro airline training
- Air Traffic Control Simulation Lab – 24 state-of-the-art ATC simulators; teaches radar and non-radar ATC procedures and methodology; simulates enroute or terminal airspace scenario worldwide; simulates ARTS III and Stage A operations and features of AAS; 225° tower simulator has voice recognition and is integrated with eight radar stations; 360° tower with 12 radar stations
- UND Aerospace Test Center – Delivers FAA knowledge exams plus IT exams; dedicated facility with 15 computer learning workstations (including four PC-ATD's) delivering custom in-house developed training software providing instruction in aircraft systems, procedures, instrument flight and examination tutorials; includes procedures and systems training software from Airbus A320 FMGS (flight management guidance system)
- Aerospace Network (ASN) Distance Learning Broadcast Center – Developed with \$10 million FAA Airway Science grant to equip interactive video classroom; satellite uplink to permit sharing aviation education and flight instruction materials with network of collegiate aviation programs and development of computer-based instructional tools; provides support for worldwide distance delivery to students in Space Studies and Aviation Master's programs
- **Clifford Hall** – \$8.4 million in funding provided by USDA; dedicated in May 1992; houses offices and labs of Atmospheric Sciences and Space Studies Departments; design of 71,500 square feet includes auditorium for student use; expands program of atmospheric research and space studies with emphasis on greater utilization of satellite-based technology for timely and accurate weather forecasting
  - 360° Air Traffic Control Tower Simulator – addition to ATC program to integrate controllers in a realistic environment; controllers train to operate in the busiest airports in aviation

#### **FLIGHT OPERATIONS FACILITIES**

- based at Grand Forks International Airport, six miles from campus; shuttle bus runs hourly between campus and flight training center
- thirteen-building flight training complex of more than 185,000 sq. ft. on 13.6 acres – instructional/administrative (39,334 sq. ft.); maintenance/shops (75,287 sq. ft.); hangars (79,780 sq. ft.)
- five-story flight operations administration building provides contract program, flight instructor office space and administrative areas; glass skywalk connects facility to other buildings in the complex
- flight planning room – computerized network of real-time weather terminals, direct access telephones to Flight Service Stations
- computerized flight records, dispatch, maintenance records connected by fiber optic link to UND Aerospace mainframe system on campus; conveniently located terminals for student use in scheduling flights and phase checks
- all flight training is monitored by a manager on duty or a supervisor of flight and is tracked electronically

#### **ATMOSPHERIC RESEARCH**

- research started with \$50,000 in 1974 to train weather modification pilots; expanded to become a major university-based atmospheric research program
- current major focus – satellite remote sensing and in situ observations of the atmosphere in support of DOE climate research program, surface transportation weather research, airborne measurements of turbulence and icing
- continuing research in weather modification and radar meteorology

## INDUSTRY VENTURES-UNDAF

- UND Aerospace Foundation (UNDAF) established in 1985 as a North Dakota non-profit corporation to promote university-industry joint ventures and technology transfer with industry; organized to build upon existing expertise and resources
  - aviation physiology training – workshops available to corporate and commercial flight crews and general aviation pilots; taught as college lab course for aviation undergraduates; designed to create awareness of physiological and psychological hazards of high altitude flight; includes hypoxia and rapid decompression flights in hypobaric chamber; directed by certified aerospace physiologist and FAA Flight Surgeon; representatives from more than 130 corporations worldwide have attended since 1989—clients range from small flight departments to national flagship airlines, as well as U.S. Air Force and Air National Guard units
  - Flight training services provided to affiliate programs in Crookston, MN; Lumberton, NC; Phoenix, AZ; Spokane, WA; and Williston, ND.
  - Air Traffic Controller contract training- customized programs for initial and recurrent training for Russia, China and Norway
  - Weather and Road Surveillance Monitoring (MNDOT, SDDOT, IDAHO)
  - Broadcasting and Video Production – commercial activities maximize the capabilities and capacity of facilities, personnel and technology
  - Educational software development/commercialization (HTMLeZ) – allows students and instructors to use web pages as educational resources without years of web design training or a well-staffed IT department
  - AIMS – Aviation Information Management System commercialization; used to keep flight records, dispatch and maintenance records, as well as scheduling, and other tools such as weight and balance and cross-country calculators
  - A contract between Tokai University and the University of North Dakota Aerospace Foundation (UNDAF) to teach approximately 60 students a year at the John D. Odegard School of Aerospace Sciences' (JDOSAS) facilities beginning in April 2007.
  - Aviation education/pilot training contracts with Far East Air Transport (Taiwan) and Air China (Peoples Republic of China) beginning January and March, 2007.
  - Transition flight training for customers of Cirrus Design Aircraft Company, including educational software development.