

**UNIVERSITY OF PRETORIA**  
**FACULTY OF ENGINEERING, BUILT ENVIRONMENT AND INFORMATION TECHNOLOGY**

**1. BIOGRAPHICAL SKETCH**

**1.1 GENERAL INFORMATION**

<b>Surname</b>	Smith			<b>Maiden name</b>				
<b>First names</b>	Lelanie			<b>ID Number</b>				
<b>Citizenship</b>	South African			<b>Title</b>	Dr	<b>Female</b>	x	<b>Male</b>
<b>Place of birth</b>	Pretoria, South Africa			<b>Date of birth</b>		1984-07-27		
<b>Population group</b>	African		Coloured		Indian		White	x
<b>Marital status</b>	Single			<b>Direct Telefax No.</b>				
<b>Direct Telephone</b>	012 420 5366			<b>E-mail</b>		Lelanie.Smith@up.ac.za		

**1.2 LANGUAGE PROFICIENCY**

English	(Read, write, speak)
Afrikaans	(Read, write, speak)
German	(Level A1, basic reading and writing)
Norwegian	(Level A1, basic reading and writing)

**1.3 HIGHEST SCHOOL QUALIFICATION**

<b>INSTITUTION</b>	<b>SUBJECTS</b>	<b>DISTINCTIONS</b>
Hoerskool Brits	Mathematics	X
	Science	X
	Computer Science	
	Additional Mathematics	X
	Geography	X
	Afrikaans	X
	English	X

**1.4 ACADEMIC QUALIFICATIONS OBTAINED**

<b>Degree/ Diploma</b>	<b>Field of study</b>	<b>Higher education institution</b>	<b>Period</b>	<b>Year of graduation</b>	<b>Distinctions</b>
BEng	Mechanical and Aeronautical Engineering	University of Pretoria	2004 – 2007	2007	9

*\*Additional coursework credited for beyond the engineering degree: Numerical Analysis, Dynamical processes, Mathematical statistics (2 modules), Financial Management (2 modules), Economics (2 modules), Astronomy, Introduction to Poetry*

BEng (Hons)	Mechanical and Aeronautical Engineering	University of Pretoria	2008	2008	2
<i>*Subject focus: Numerical methods and optimisation, Numerical thermoflow, Advanced fluid mechanics and Advanced heat transfer</i>					
MEng	Mechanical and Aeronautical Engineering	University of Pretoria	2009 – 2011	2011	
PhD	Mechanical and Aeronautical Engineering	University of Pretoria	2013 – 2017	2017	

1.5 WORK EXPERIENCE TO DATE		
Name of employer	Capacity and/or type of work	Period
Self	Additional mathematics tutor for children requiring intervention (ages 15-18)	2007 – 2013
University of Pretoria	Junior lecturer	2009
University of Pretoria	Junior lecturer (part-time)	2010 – 2011
University of Pretoria	Lecturer	2012 – currently

## 2. TEACHING AND LECTURING DUTIES

Course	Level (second year, etc.)	Academic Institution	Degree/ Diploma	Curriculum design
Innovation and Design	1	UP	BEng	Partly
Graphic Communication (Technical drawing and manufacturing)	1	UP	BEng	Yes
Thermo Flow (Fluid Mechanics)	3	UP	BEng	No
Design (Final year design project supervision)	4	UP	BEng	No
Project (Final year research project supervision)	4	UP	BEng	No

<b>Educational courses attended</b>	<p><b>Engineering</b>  Practical Workshop Training (2004)  Occupational Health and Safety Act Training (2013)  NMISA Basic laser safety Training (2014)  First Aid Level 1 and 2 (2015)</p> <p><b>Education</b>  ClickUP training course (online course management) (2013)  Assessment Workshop for Academics (2013)  Seventh engineering education “master-class” workshop: Large Class Teaching in a Multi-Cultural, Multi-Ability &amp; Multi-Disciplinary Setting (2019)  Eight engineering education “master-class” workshop: Fostering Inclusivity in Engineering Education in the South African Context (2019)</p>
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	<p><b><u>Management and personal development</u></b>          Neuro-success with Dr Ian Weinberg (2013)          Enneagram (Personality typology and typing; Certification training to facilitate groups and individuals) (2016 – 2018)          Logotherapy (2017)          Tension and trauma releasing exercises (Certification training to facilitate groups and individuals) (2018)          Cultivating compassionate listening (2019)</p>
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### 3. RESEARCH

RESEARCH FIELD	SPECIALITY
Computational fluid dynamics Numerical methods and optimization Engineering design education	Computational fluid dynamics Applied aerodynamics Design education

#### 3.1 RESEARCH DUTIES

3.1.1. Former supervision or co-supervision (completed)			
Name of student	Degree/Title of dissertation/ thesis and date	Supervisor/ Co-supervisor(s)	Duration of studies (years)
M Kruger	MEng: Applying the gull-wing fuselage configuration to a wide body airliner (2014)	Prof JP Meyer Dr L Smith Mr RJ Huysen	2

3.1.2. Current supervision or co-supervision			
Name of student	Degree/Title of dissertation/ thesis and date	Supervisor/ Co-supervisor(s)	Duration of studies (years)
K Alberts	MEng: Airframe propulsion integration	Dr L Smith Prof KJ Craig	2 (part-time)
M Lee	MEng: Fuselage aftbody analysis and optimisation for efficient propulsion integration	Dr L Smith Prof KJ Craig	1
A Sharma	MEng: Wing-body-tail CFD application case study for improved aerodynamic and stability of the AREND UAV	Dr L Smith Prof KJ Craig	1
N Mutangara	MEng: Drag reduction analysis and fuselage optimization for boundary layer ingestion propulsion	Dr L Smith Prof KJ Craig	1
J van Schalkwyk	MEng: Redesign and optimization of the MWEWE UAV for improving aircraft endurance	Dr L Smith Prof KJ Craig	1
F Will	MEng: Redesign and optimization of the AREND UAV for stable and efficient flight	Dr L Smith Prof A Strohmayer	1
C Niebuhr	PhD: Quantifying the downstream turbulence intensity and recovery of an axial flow hydrokinetic turbine using validated CFD models	Dr L Smith (co-supervisor)	2

<b>3.1.3. Obtaining research funds</b>			
<b>Origin of research funds</b>	<b>Title of research project or program</b>	<b>Duration</b>	<b>Money allocated (R)</b>
Study Abroad Research Grant, DRIS, UP (2013)	Collaborative aerospace research with the University of Southern California	6 weeks	R60 000
Fluxion (Arm Scor) (2014)	Aerodynamic investigation of an oval fuselage body shape	1yr	R16 000
Matomo (2014)	Investigation of the optimum layout of a wind farm	1yr	R20 000
Arm Scor (Fluxion) (2015)	Investigation of the impact of the trailing edge truncation on an airfoil for aerodynamic performance	1yr	R32 000
Knowledge interchange and collaboration funding (KIC) NRF (2015)	Optimisation of a wing-body-tail configuration with an alternative low drag fuselage and body trailing edge	2 weeks in 2015	R30 000
Staff Exchange Funding, DRIS, UP (2015)	Particle image velocimetry training at the University of Southern California	3months in 2015	R50 000
PhD Completion Funding, University of Pretoria (2016)	Investigation of a modified low-drag body for an alternative wing-body-tail configuration	1yr	R60 000
Staff Exchange Funding, DRIS, UP (2017)	Boundary layer ingestion and airframe propulsion integration at Cranfield University	6 weeks in 2017	R50 000
NRF Thuthuka Funding (2019)	Airframe propulsion integration	1 yr	R274 000

## **3.2 RESEARCH OUTPUT**

<b>3.2.1 Publications in refereed accredited journals</b>
Smith, L., Oxtoby, O.F., Malan, A.G. and Meyer, J.P., 2013. "An interactive boundary layer modeling methodology for aerodynamic flows," <i>International Journal of Numerical Methods for Heat and Fluid Flow</i> , Vol. 23, No. 8, pp. 1373 – 1392. (Impact factor: 2.14)
Smith, L., Craig, K.J., Meyer, J.P. and Spedding, G.R., 2016. "Modifying low-drag bodies to generate lift: a computational study," <i>Journal of Aircraft</i> , Vol. 54, No. 3, pp. 1150–1161. (Impact factor: 0.84)
Tank, J., Smith, L. and Spedding, G.R., 2016. "On the possibility (or lack thereof) of agreement between experiment and computation of flow over wings at moderate Reynolds numbers," <i>Interface Focus</i> , Vol. 7, Iss. 1, pp. 1 – 15. (Impact factor: 3.165)
Smith, L., Craig, K.J., Meyer, J.P. and Spedding, G.R., 2019. "Numerical investigation of the aerodynamic performance for an alternative wing-body-tail configuration," <i>Journal of Aircraft</i> , Vol. 56, No. 1, pp. 250 - 261. (Impact factor: 0.84)

<b>3.2.2 Papers accepted for publication in refereed accredited journals</b>

<b>3.2.3 Papers submitted for publication in refereed accredited journals</b>

<b>3.2.4 Papers in preparation for publication in refereed accredited journals (order of anticipated readiness)</b>

Smith, L. and Viljoen, M.N., "Crossing curricular boundaries with international project-based learning to foster engineering innovativeness in students," <i>Journal of Engineering Education</i> . (Impact factor: 3.41)
Smith, L., Craig, K.J., Van Schalkwyk, J., "Optimization of the MWEWE UAV for improving in aircraft endurance," <i>Journal of Aircraft</i> . (Impact factor: 0.84)
Smith, L., Craig, K.J., Lee, M.N. and Alberts, K., "Application studies of the power balance method for alternative aircraft configuration studies," <i>Journal of Aircraft</i> . (Impact factor: 0.84)
Smith, L., Craig, K.J. and Sanders D, 2020. "Energy/Exergy method analysis to evaluate aerodynamic performance for an alternative wing-body-tail configuration," <i>Journal of Aircraft</i> , (Impact factor: 0.84)

### **3.2.5 Papers presented and published in international conference proceedings**

Smith, L., Spedding, G.R. and Meyer, J.P., "Numerical and laboratory experiments on a new wing-body-tail configuration," <i>54th AIAA Aerospace Sciences Meeting</i> , AIAA SciTech, AIAA 2016-0800, San Diego, CA, 4 –8 Jan 2016.
Koster, J.N., Buysse, A., Smith, L., Huysen, J.R., Hotchkiss, J., Malangoni, J. and Schneider, J., "AREND: A sensor aircraft to support wildlife rangers," <i>57th AIAA/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference</i> , AIAA SciTech, AIAA 2016-0827, San Diego, CA, 4 – 8 Jan 2016.
Smith, L., Craig, K.J., Meyer, J.P. and Spedding, G.R., "Optimisation of a wing-body-tail configuration with an alternative low drag fuselage and body trailing edge," <i>30<sup>th</sup> Congress of the International Council of Aeronautical Sciences</i> , ICAS 2016-0223, Daejeon, 25 – 30 Sept 2016.
Smith, L., Koster, J.N. and Schneider, J., "Experience with international collaborative aircraft design education: AREND UAV," <i>31st Congress of the International Council of Aeronautical Sciences</i> , ICAS 2018-0217, Belo Horizonte, 9-14 Sept 2018.

### **3.2.6 Conference papers presented (but not published)**

Smith, L., Oxtoby, O.F., Malan, A.G. and Meyer, J.P., "Efficient modeling of aerodynamic flows in the boundary layer for high performance computing," <i>2<sup>nd</sup> International Aerospace Society of South Africa</i> , Gordons Bay, South Africa, 23 – 25 Nov 2010.
Smith, L., Oxtoby, O.F., Malan, A.G. and Meyer, J.P., "An interactive boundary layer modeling methodology for aerodynamic flows," <i>ASME, Mechanical Engineering Congress</i> , Denver, CO, 11 – 17 November 2011.
Smith, L., Craig, K.J., Meyer, J.P. and Spedding, G.R., "Investigation of a low drag body for an alternative wing-body-tail configuration," <i>International Aerospace Society of South Africa</i> , Stellenbosch, South Africa, 14 – 16 Sept 2015.
Smith, L., Huysen, R.J., Buysse, A. and Koster, J.N., "AREND – A Globally Designed Sensor UAS to Combat Wildlife Poaching," <i>International Aerospace Society of South Africa</i> , Stellenbosch, South Africa, 14 – 16 Sept 2015.
Smith, L., "AREND UAV: An engineering design education project," <i>Aeronautical Society of South Africa Annual Conference</i> , Somerset-Wes, South Africa, 24-26 Oct 2018.
Smith, L., "Challenges and solutions in an international collaborative aircraft design education project," <i>REES</i> , Cape Town, South Africa, 10-12 Jul 2019.
Matthee, N., Smith, L., van der Merwe, A., and Liebenberg, J., "Using technology as scaffolding for a Mind, Brain and Education aligned learning intervention: An MGC110 case study," <i>Flexible Futures: Higher Education Innovation Conference and Expo</i> , Pretoria, South Africa, 9 – 10 September 2019.

### **3.2.7 Conference papers (co-author)**

Kruger, M., Huysen, R.J, Smith, L. and Meyer, J.P.' "Application of a low fineness ratio fuselage to an airliner configuration," <i>54th AIAA Aerospace Sciences Meeting</i> , AIAA SciTech, AIAA 2016-1282, San Diego, CA, 4 –8 Jan 2016.
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Claassen, C., Matthee, N., Van der Merwe, A., Matthee, M. and Smith, L., "Using technology as scaffolding for Mind, Brain and Education principles to support at-risk engineering students," *Flexible Futures: Higher Education Innovation Conference and Expo*, Pretoria, South Africa, 4 - 5 October 2018.

Mutangara, N., Smith, L. and Craig K.J. "Numerical implementation of the Power Balance Method for Boundary Layer Ingestion," *Aeronautical Society of South Africa Annual Conference*, AeSSA2019-02, Pretoria, South Africa, 16-18 Oct 2019.

Lee, M.H., Smith, L. and Craig K.J. "Analysis of Power Balance Methodology for Propulsion integration system," *Aeronautical Society of South Africa Annual Conference*, AeSSA2019-20, Pretoria, South Africa, 16-18 Oct 2019.

### 3.2.7 Books / Textbooks Revisions

Smith L and Meeser RF. Graphical Communication. (Not for Mechanical and Industrial Engineers) *Department of Mechanical and Aeronautical Engineering*. Wiley Custom. 2015.

## 4. OTHER SCHOLARLY RESEARCH-BASED CONTRIBUTIONS

### 4.1 Participation in conferences, workshops and short courses - specify type of contribution:

#### 4.1.1 National

Smith, L. "Aircraft for Rhino and Environmental defense," *Commercial Unmanned Aircraft Association of Southern Africa meeting*, Africa Aerospace and Defense Expo, Centurion, South Africa, 17 – 19 September 2014.

Smith, L. "International collaborative, vertically integrated aircraft design education: AREND UAV," *Electronic warfare South Africa 2017 - International conference and exhibition*, Pretoria, 6-8 Nov 2017.

Smith, L., "The advantages and challenges of the use of CFD to assist with experimental evaluation," *Star conference South Africa*, Centurion, South Africa, 19 – 20 Sept 2016.

Smith, L. "Update and future plan for the AREND UAV design education project," *4<sup>th</sup> UAV Forum*, Pretoria, 29 Nov 2017.

Smith, L. "Status and role of the AREND Project in SA," *DroneCon*, Midrand, 17 May 2018.

Smith, L. "Networking," *DPSS youth forum lecture series*, Council of Scientific and Industrial Research, Pretoria, 24 July 2018.

#### 4.1.2 International

Smith, L., Buysse, A. and Koster, J.N., "AREND – A Globally Designed Sensor UAS to Combat Wildlife Poaching," *AIAA SciTech*, Kissimmee, FL, 5 – 9 January 2015 [*Co-presenter and panel member*].

Smith, L., "A global collaborative education project to design a UAS to prevent wildlife poaching," *7<sup>th</sup> EASN International Conference on Innovation in European Aeronautics Research*, Warsaw, Poland, 26-29 Sept 2017.

### 4.2 Teamwork and collaboration with others (please specify):

Collaborative research with University of Southern California (USC) in the USA on "Wind tunnel investigations viscous/inviscid interactions in standard and novel aircraft configurations" using PIV technologies (2013 – 2016)

Team leader for international research group AREND to develop UAV solutions for SANParks (2014 – 2017) Universities involved are University of Stuttgart (Germany), Helsinki Metropolia (Finland) and

Colorado University (US). Two Erasmus + formal agreements (*in progress*) with VGTU, Lithuania and UiT in Norway.

Bilateral agreement (*In progress*) with Cranfield University in the UK on “Development of novel highly integrated multi-physics and numerically based methods that will be used for the aerodynamic modelling, analysis and assessment of future integrated propulsion systems” (2019-2024)

<b>4.3 Membership of national and international bodies</b>
Member of The American Institution of Aeronautics and Astronautics (2014 – 2019).
Member of Woman in Aviation International (2016 – 2019).
Member and UP representative at the Joint Aerospace Steering Committee (2018 – 2019)
Member of SASEE (2018 – 2019)

<b>4.4 Visits to local and overseas universities or research institutes as guest professor or researcher</b>
Scholar exchange program with University of Southern California (USC), LA, California, USA to set up PhD collaboration research projects and receive basic training in particle image velocimetry (PIV) (July/August 2013).
Staff exchange program with USC on PIV post processing software simulation and CFD simulation support (Nov 2014 to Feb 2015).
PhD academic development program to USC to complete wind tunnel testing and final write up of PhD. Part-time work as lab assistant in the AME labs at USC (2016).
UAV Design team member at the CSIR (Oct to Dec 2017).
Engineering education advisor for development of intervention materials for Graphical Communications. Contract based work for the University of Pretoria (Department of Education Innovation) (Oct 2017 to Dec 2018).
Research exchange to the hybrid propulsion group (Dr P Laskaridis) at Cranfield University, UK on airframe propulsion integration topics to facilitate collaboration with UP (Dec 2017 to Jan 2018)
Collaborative engagement visit to Vilnius Technical University in Vilnius, Lithuania to facilitate both research and educational collaborative projects (June 2018)

<b>4.5 Mentorship and supervision of international students</b>			
<i>Student</i>	<i>Level and University</i>	<i>Advisors</i>	<i>Year</i>
J Schneider	MEng (Stuttgart University, Germany)	Prof A Strohmayer Dr L Smith Mr RJ Huyssen	2014
A Buysse	MEng (Colorado University, USA)	Prof J Koster Dr L Smith	2015
L Fels	MEng (Stuttgart University, Germany)	Prof A Strohmayer Dr L Smith Mr J Schneider	2017/2018
A Carriquabure	Intern, École Nationale Supérieure de Mécanique et d'Aérotechnique (ENSMA)	Dr L Smith	2018
T Labourdette	Intern, École Nationale Supérieure de Mécanique et	Dr L Smith	2018

	d'Aérotechnique (ENSMA)		
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<b>4.6 Coordination of graduate short courses</b>
Flight Mechanics, presented by Dr MM Lone from Cranfield University's Aircraft Integration Research Centre, a Centre jointly funded by Airbus, Rolls Royce, the Higher Education Funding Council for England (2019).
Unmanned Aerial Systems Technology by Mr P Barrier graduated as aeronautical engineer from the French "Ecole Nationale Supérieure de l'Aéronautique et de l'Espace" (2019).

<b>4.7 Internal and External Examinations</b>			
<i>Student</i>	<i>Level and University</i>	<i>Title</i>	<i>Year</i>
A Saligram	MSc Mechanical Engineering (WITS)	Design and verification of a controlled induced mass flow system	2018
A Beneke	MEng Mechanical and Aeronautical Engineering (UP)	The simultaneous optimization of the nose and tail geometry of a high speed train for drag and crosswind stability	2018
JP Theron	MEng Mechanical and Aeronautical Engineering (UP)	Practical implementation of a trajectory planning algorithm for an autonomous UAV	2018
N Mthembu	MSc Mechanical Engineering (NWU)	Turbulent wake influence on sailplane performance	2018
S Poprawa	PhD Mechanical and Aeronautical Engineering (UP)	Statistical approach to payload capability forecasting for large commercial aircraft operating payload range limited routes	2019
V Le Roux	MSc Mechanical Engineering (NWU)	CFD airfoil profile drag calculation using far-field wake analysis	2019

<b>4.8 H-index and citations</b>
Scopus Profile: H-index 2 with 10 citations.
Google Scholar Profile: H-index 3 with 24 citations.

## 5. AWARDS

<b>5.1 Research Awards</b>
Technical Design Education Committee Award for best paper and presentation in Innovative design and education. Awarded at the AIAA SciTech Conference in San Diego, CA in 2016 for the presentation and paper titled "AREND: A sensor aircraft to support wildlife rangers".



## 5.2 Teaching Awards

Faculty of Engineering, Built environment and IT Teaching and Learning Excellence Award (2017)  
Management and coordination of the international design education project, Team AREND.

## 6. MANAGEMENT AND ADMINISTRATIVE DUTIES (LEADERSHIP)

### List your involvement in departmental activities (e.g. administrative functions), faculty (e.g. faculty committees) or other university activities

Marketing Committee (2012 – 2017) with specific duties of arranging industry visits (2012 – 2013) and organizing Engineering Week (2013 – 2017). Development of the marketing strategy for the Aeronautical Engineering visits.

Development and coordination of the AREND UAV team. Project manager and team leader of the multi-disciplinary, multi-national vertically integrated project, integrated and credit into the Mechanical and Aeronautical Engineering undergraduate program (2014 – 2019).

Faculty of Engineering, Built environment and IT Curriculum Transformation committee (2017 – 2019).

Department of Mechanical and Aeronautical engineering coordination of Aeronautical post graduate track with industry and research group needs. Subject alignment and hybrid teaching in the post graduate track (2017 – 2019).

Coordination and facilitation of the delegation from VGTU (Vilnius Technical University) collaborative visit to the Department of Mechanical and Aeronautical engineering at UP (July and Nov 2018).