

**Proposal for 2020 Mayterm/Summer Off-Campus Programs:
Mathematics / Computer Science / Data Analytics Majors
Maria (Maryke) van der Walt**

Title: Encounters with Numbers and South Africans

Focus: The goal of this program is two-fold: students will be introduced to Numerical Mathematics by a world-renowned researcher in the field, and they will study South African history while being immersed in its culture. These goals will be achieved through lectures and computer labs at Stellenbosch University (my alma mater) and outings in and around the Stellenbosch and Cape Town area (where I grew up).

Student participants: The proposed program is aimed primarily at students majoring in Mathematics, Computer Science and Data Analytics. I am excited about expanding the study abroad offers for these majors.

Courses offered: I intend to offer four courses that will be taken by all the participating students:

- **CS/MA 150: Numerical Mathematics (4 units)**

CS/MA 150 is a topics course currently in the Westmont Catalog, giving major credit for Mathematics, Computer Science and Data Analytics. I intend that the course will be co-taught by Dr JAC Weideman (from Stellenbosch University) and me. I attach a preliminary syllabus.

- **Reconciliation in South Africa (3 units)**

The purpose of this course is to study South African history while being immersed in its culture. I intend for it to fulfill the GE requirements *Thinking Globally* and *Understanding Society*. Specifically, we will focus on the history of racial injustice in South Africa and the progress that is being made towards reconciliation and peace among different ethnic groups. My hope is that this course will help students to see beyond themselves and their own experiences, and that this will help them to grow in love towards people unlike them and towards our Savior who calls to Himself peoples of all tribes and nations. I attach a preliminary syllabus.

- **Physical Education Activity (1 unit)**

Much like Santa Barbara, the Cape Town area provides numerous hiking opportunities. For this PEA course, students will hike Lion's Head in Cape Town and trails in the Table Mountain National Park and Kirstenbosch National Botanic Garden for a total of 18 hours. In addition, students will walk to and from class and church while in Stellenbosch and while on outings in Cape Town. This should account for another 6 hours. In total, these 24 hours of physical activity corresponds to the time spent in class in a PEA course taken on campus during regular semesters.

- **Serving Society (0 units)**

Students will participate in a service project related to the course *Reconciliation in South Africa*. I intend to partner with Gereformeerde Kerk Stellenbosch (my home church when I lived in South Africa) in their outreach projects. Specifically, Stellenbosch University students who are members at Gereformeerde Kerk Stellenbosch take part in an annual outreach in June to the local township, Idasvallei. During the outreach, students tutor middle school and high school students, visit patients in hospitals and provide food to the homeless. I envision that our students can join the Stellenbosch University students in this outreach.

Faculty:

- The program will be led by me.
- I intend that Dr JAC Weideman from Stellenbosch University and I will co-teach the course CS/MA 150. Dr Weideman is a world-renowned researcher in the area of Numerical Analysis. He was recently elected as a Fellow of the Society of Industrial and Applied Mathematics (SIAM), one of the world's leading organizations in the field of Applied Mathematics. I attach his curriculum vitae.

Preliminary itinerary: See below:

Spring 2020	Pre-program session to introduce the program.
Week 1	Monday May 11 – Friday May 15: Meet on campus
	This will be a time to foster community in the group. This will also be a week of intensive coursework and lectures to kickstart our academic program.
CS/MA 150	Introduction to MATLAB, finite precision arithmetic, rounding error and stability, solving nonlinear equations numerically, Test 1 <i>15 hours class time</i>
Reconc in SA	Precursors and the ideology of Apartheid (Gordon, Parts II.1, II.2) <i>5 hours class time</i>
Week 2	Monday May 18 – Sunday May 24: South Africa
	Meet in Cape Town, South Africa on May 18. Travel by bus to Stellenbosch (about 30 miles from Cape Town) where we will be stationed for the rest of the program.
CS/MA 150	Solving linear systems numerically <i>10 hours class time</i>
Reconc in SA	Resistance and repression (Gordon, Part II.5, Mandela, Parts 8, 9) Tour of Iziko Slave Lodge and Robben Island Guest lectures: Faculty members from University of Western Cape Dept of History Film night: Sarafina! <i>5 hours class time</i>
PEA	Hike Lion's Head. <i>6 hours, weekend</i>
Week 3	Monday May 25 – Sunday May 31: South Africa
CS/MA 150	Interpolation using polynomials and cubic splines Guest lecture: Faculty member from Stellenbosch University Dept of Applied Math <i>10 hours class time</i>
Reconc in SA	Life under Apartheid (Gordon, Part II.6, Noah, Part 1) Tour of District Six Museum Guest lectures: Faculty members from Stellenbosch University Dept of History <i>5 hours class time</i>
PEA	Hike in Table Mountain National Park. <i>6 hours, weekend</i>

Week 4	Monday June 1 – Sunday June 7: South Africa
CS/MA 150	Numerical integration Guest lecture: Faculty member from Stellenbosch University Dept of Applied Math <i>10 hours class time</i>
Reconc in SA	Ending Apartheid and reconciliation (Gordon, Part II.7, Noah, Part 2) Tour of Langa and Gugulethu Guest lectures: Faculty members from Stellenbosch University Dept of Sociology Film night: Invictus <i>5 hours class time</i>
PEA	Hike in Kirstenbosch National Botanic Garden. <i>6 hours, weekend</i>
Week 5	Monday June 8 – Friday June 12: South Africa
CS/MA 150	Numerical solution of differential equations, Test 2 <i>5 hours class time</i>
Reconc in SA	Ending Apartheid and reconciliation (Mandela, Parts 10, 11, Noah, Part 3) Attend a rehearsal of Libertas Choir, meet students from Funda Fundisa Guest lectures: Faculty members from Stellenbosch University Dept of Political Science <i>5 hours class time</i>
Serv Soc	Join students from Gereformeerde Kerk Stellenbosch in outreach projects.
	Last day of class in South Africa on Friday June 12.

Budget: Note: I am working with a dollar/rand exchange rate of R12 to \$1. This is fairly conservative; the average rate for the last three years was R13.75.

- Faculty compensation:
 - Assistant professor: $\$1587 \times 4 \text{ units} = \6348
 - Professor: $\$1820 \times 4 \text{ units} = \7280
 - Guest lectures by church leaders and Stellenbosch University faculty for the Reconciliation in South Africa course: $\$200 \times 8 = \1600
 - Guest lectures by Stellenbosch University faculty for CS/MA 150: $\$200 \times 2 = \400
 - There are a few experts in Data Science on the faculty at the Applied Mathematics department of Stellenbosch University, and I would like to take advantage of this opportunity to give our students exposure to current research activities in this area.*
- Accommodation:
 - $\$100 \text{ per person} \times 25 \text{ nights} = \2500 per person
- Meals:
 - $\$40 \text{ per person} \times 25 \text{ days} = \1000 per person
- Bus and driver for transportation between Stellenbosch and Cape Town:
 - $\$300 \times 8 \text{ days} = \2400
- Rental car:
 - $\$1000 \text{ all-inclusive}$
- Renting facilities from Stellenbosch University for lectures:
 - $\$50 \times 19 \text{ days} = \950
- Activity expenses:
 - Robben Island: $\$30 \text{ per person}$

Tour of Langa and Gugulethu: \$25 per person
Tour of Iziko Slave Lodge: \$5 per person
District Six Museum: \$5 per person
Table Mountain National Park: \$30 per person
Kirstenbosch National Botanic Garden: \$6 per person

- Administrative stipend:
I will be taking care of administrative duties myself.
1-10 students: \$3000; 11-20 students: \$4000

In summary, the group expenses add up to \$22978 for 1-10 students and \$23978 for 11-20 students, and the per-person expenses add up to \$3601 per person. Therefore, the expense per student, excluding airfare, is as follows:

- With 8 students going, the total expense per student is \$6473.25.
- With 10 students going, the total expense per student is \$5898.80.
- With 12 students going, the total expense per student is \$5599.17.
- With 14 students going, the total expense per student is \$5313.71.
- With 16 students going, the total expense per student is \$5099.63.

Accompanying family members: I plan that my husband and daughter (who will be 18 months old in mid-2020) will accompany me.

CS/MA-150: Numerical Mathematics

May/June 2020

Instructors: Dr Maryke van der Walt and Dr Andre Weideman

Meeting times: 10 hours per week

Catalog Description: (4 credit hours) Prerequisite: MA-010. Programming experience is desirable but not essential. MA-150: Course content will be determined by student interest and need. CS-150: Special courses offered on selected advanced topics in computer science. Content as announced. May be repeated for credit in a different topic. Counts toward major credit for B.S. in Computer Science, Data Analytics or Mathematics and B.A. in Computer Science and Mathematics.

Required resources:

- Timothy Sauer, Numerical Analysis, 2nd Edition, Pearson, 2012.
- MATLAB student license.

Overview and Objectives: The purpose of this course is to study a number of computer methods for solving mathematical problems that would be difficult (or even impossible) to solve analytically.

The topics covered include: finite precision arithmetic, rounding error and stability, solving nonlinear equations numerically, solving linear systems numerically, interpolation using polynomials and cubic splines, numerical integration and numerical solution of differential equations. Students will use MATLAB (one of the standard languages used by applied mathematicians) to implement these methods.

The course will be co-taught by Dr van der Walt (Westmont) and Dr Weideman (Stellenbosch University). Dr Weideman is a world-renowned researcher in the area of Numerical Analysis. He was recently elected as a Fellow of the Society of Industrial and Applied Mathematics (SIAM), one of the world's leading organizations in the field of Applied Mathematics.

Course Learning Outcomes: Formally, the course objectives described above can be summarized in the following course learning outcomes: By the end of this course, students should be able to:

- (i) demonstrate mastery of the fundamental concepts as listed in the Overview and Objectives above;
- (ii) use their mathematical knowledge to describe phenomena and solve problems encountered in the world around them;
- (iii) display logical reasoning when faced with non-routine problems;
- (iv) present sound mathematical arguments, both verbally and in written form;
- (v) incorporate their mathematical skills and knowledge into their thinking about the Triune God and their identities as followers of Christ.

These outcomes will be assessed through written and computer assignments and exams.

Program Learning Outcomes: The course learning outcomes described above reflect the program learning outcomes formulated by the Mathematics department at Westmont College:

- (1) Core Knowledge: Students will demonstrate knowledge of the main concepts, skills, and facts of the discipline of mathematics – reflected in (i).
- (2) Communication: Students will be able to communicate mathematical ideas following the standard conventions of writing or speaking in the discipline – reflected in (iv).
- (3) Creativity: Students will demonstrate the ability to formulate and make progress toward solving non-routine problems – reflected in (ii) and (iii).
- (4) Christian Connection: Students will incorporate their mathematical skills and knowledge into their thinking about their vocations as followers of Christ – reflected in (v).

Tentative Schedule:

Week 1	Introduction to MATLAB Finite precision arithmetic, rounding error and stability Solving nonlinear equations numerically Test 1
Monday May 18	Meet in Cape Town, South Africa
Week 2	Solving linear systems numerically
Week 3	Interpolation using polynomials and cubic splines
Week 4	Numerical integration
Week 5	Numerical solution of differential equations Test 2
Friday June 12	Last day of class in South Africa

Assignments: Every week, you will complete an assignment consisting of exercises in hand-calculation, problem-solving and computer implementation. You are more than welcome to collaborate with your class mates on these assignments, as long as you write and turn in your own set of solutions and list the names of your collaborators on your solutions.

Tests: We will have two written tests in class: one at the end of Week 1 and one at the end of Week 5.

Grading: Your grade will be calculated as follows:

Assignments: 34%

Two tests: 33% each

I will assign grades on the usual 90/80/70/60 scale; plus and minus grades will be assigned as appropriate. In borderline cases, I reserve the right to take into account consistency of attendance and participation.

Attendance: If you miss a significant number of classes, you will almost certainly do poorly in this class. If you miss more than six classes without a valid excuse, I reserve the right to terminate you from the course with a grade of F – this is in line with Westmont’s attendance policy, which is available at http://www.westmont.edu/_offices/registrar/academic_policies/attendance-policies.html. Students are responsible for obtaining information and assignments distributed during missed classes. Class notes for missed days should be obtained from a fellow student and not the instructor.

Academic Integrity: Dishonesty of any kind may result in loss of credit for the work involved and the filing of a report with the Provost's Office. Major or repeated infractions may result in dismissal from the course with a grade of F. Westmont's plagiarism policy is available at https://westmont.edu/_offices/provost/Plagiarism/policydoc.pdf.

Accommodation Procedure: Students who have been diagnosed with a disability (learning, physical or psychological) are strongly encouraged to contact the Disability Services office as early as possible to discuss appropriate accommodations for this course. Formal accommodations will only be granted for students whose disabilities have been verified by the Disability Services office. These accommodations may be necessary to ensure your equal access to this course. Please contact Sheri Noble, Director of Disability Services (310A Voskuyl Library, 805-565-6186, snoble@westmont.edu) or visit http://www.westmont.edu/_offices/disability/.

Reconciliation in South Africa

May/June 2020

Instructor: Dr Maryke van der Walt
email: mvanderwalt@westmont.edu
Office: Winter Hall 305
Office Phone: 805-565-6297
Meeting times: 5 hours per week plus activities / site visits

Required resources:

- *Long Walk to Freedom* by Nelson Mandela.
- *Apartheid in South Africa: A Brief History with Documents* by David M. Gordon.
- *Born a Crime: Stories from a South African Childhood* by Trevor Noah.

Overview and Objectives: (3 credit hours) The purpose of this course is to study South African history while being immersed in its culture. Specifically, we will focus on the history of racial injustice in South Africa and the progress that is being made towards reconciliation and peace among different ethnic groups. My hope is that this course will help students to see beyond themselves and their own experiences, and that this will help them to grow in love towards people unlike them and towards our Savior who calls to Himself peoples of all tribes and nations.

Course Learning Outcomes (CLO's): Formally, the course objectives described above can be summarized in the following course learning outcomes: By the end of this course, students should be able to:

- (i) understand the history of racial injustice in South Africa, including perspectives from different ethnic groups in South Africa, and describe some of the progress that is being made towards reconciliation in South Africa;
- (ii) apply their knowledge about racial injustice and reconciliation in South Africa to analyze injustice and discrimination they observe in the world today;
- (iii) reflect upon how their observation of racial injustice and reconciliation in South Africa shapes their own world view and identities as followers of Christ, with particular reference to injustice and discrimination.

These outcomes will be assessed through written assignments and group discussions.

General Education: This course fulfills the General Education requirement *Thinking Globally* because it emphasizes understanding of different world contexts and interaction with people of different cultures and ethnicities (CLO i) and exploring the ethical demands for Christians in light of their observations of injustice and reconciliation in South Africa (CLO iii). It also fulfills the General Education requirement *Understanding Society* because it emphasizes understanding of the interplay among different groups and institutions in society and applying this knowledge to analyze contemporary problems (CLO ii), as well as incorporating this knowledge into their thinking about their identities as followers of Christ (CLO iii).

Planned Group Activities: Students will engage in the following activities while in South Africa:

- **Tour Robben Island:**
Visit the site where Nelson Mandela, the first president of South Africa elected in a fully representative democratic election, was incarcerated for 18 years.
- **Tour District Six Museum:**
District Six was a neighborhood designated for non-whites during the Apartheid regime.
- **Tour Iziko Slave Lodge:**
A museum that explores the history of slavery in South Africa.
- **Tour Langa and Gugulethu:**
A local resident act as tour guide of two townships in Cape Town.
- **Visit Funda Fundisa:**
Interact with students from a Stellenbosch University campus club that provides tutoring services to high school students from a local township.
- **Visit Libertas Choir:**
Interact with members of a choir that was established in 1988 with the mission of fostering harmonious co-existence between the respective cultural communities in South Africa through choral music, as reflected in the choir's membership.
- **Attend guest lectures by faculty from Stellenbosch University and University of the Western Cape.**

Tentative Schedule:

Week 1	Precursors and the ideology of Apartheid Discussions: Gordon, Parts II.1, II.2
Monday May 18	Meet in Cape Town, South Africa
Week 2	Resistance and repression Activities: Tour of Iziko Slave Lodge and Robben Island Guest lectures: Dr Andrew Bank? Dr Ciraj Rasool? Dr David Scher? Dr Leslie Witz? (all from University of Western Cape Dept of History) Discussions: Gordon, Part II.5, Mandela, Parts 8, 9 Film night: Sarafina!
Week 3	Life under Apartheid Activities: Tour of District Six Museum Guest lectures: Dr Chet Fransch? (Stellenbosch University Dept of History) Discussions: Gordon, Part II.6, Noah, Part 1
Week 4	Ending Apartheid and reconciliation Activities: Tour of Langa and Gugulethu Guest lectures: Dr Cheryl Walker? Dr Bernhard Dubbeld? (all from Stellenbosch University Dept of Sociology) Dr. Lee-Shae Salma Scharnick-Udemans? (University of Western Cape Dept of Religion) Discussions: Gordon, Part II.7, Noah, Part 2 Film night: Invictus
Week 5	Ending Apartheid and reconciliation, lessons learned Activities: Attend a rehearsal of Libertas Choir, meet students from Funda Fundisa Guest lectures: Dr Amanda Gouws? Dr Nicola de Jager? (all from Stellenbosch University Dept of Political Science) Discussions: Mandela, Parts 10, 11, Noah, Part 3
Friday June 12	Last day of classes in South Africa

Assignments: Students will complete a number of written assignments in this course:

- Reading log:
Short reflections / essays on the course texts.
- Activity log:
Short reflections / essays on each of the planned group activities.
- Essay:
A reflective essay composed at the end of our time in South Africa.

Grading: Grades will be calculated as follows:

Participation and group discussions:	20%
Reading log:	25%
Activity log:	25%
Essay:	30%

Academic Integrity: Dishonesty of any kind may result in loss of credit for the work involved and the filing of a report with the Provost's Office. Major or repeated infractions may result in dismissal from the course with a grade of F. Westmont's plagiarism policy is available at https://westmont.edu/_offices/provost/Plagiarism/policydoc.pdf.

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Curriculum Vitae: J.A.C Weideman

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Applied Mathematics Division
University of Stellenbosch
Stellenbosch 7600

Updated March 2019

weideman@sun.ac.za
<http://appliedmaths.sun.ac.za/~weideman/>
027-21-808-4224

PERSONAL

Born: November 25, 1957, Bloemfontein, South Africa.

Marital Status: Married, three children.

EDUCATION

1978: B.Sc. (Mathematics and Applied Mathematics), University of the Orange Free State (UOFS), Bloemfontein, South Africa.

1979: B.Sc. Honns. (Applied Mathematics), UOFS.

1980: M.Sc. (Applied Mathematics), UOFS.

1986: Ph.D. (Applied Mathematics), UOFS. Supervisor: Prof. B.M. Herbst.

EMPLOYMENT

1980–89: Lecturer–Senior Lecturer, Department of Applied Mathematics, UOFS.

1986–87: Visiting Scholar, Massachusetts Institute of Technology, Cambridge, Mass., USA (on leave from UOFS).

1990–1994: Assistant Professor (tenure track), Department of Mathematics, Oregon State University, Corvallis OR, USA.

1995–1998: Associate Professor (with indefinite tenure), Department of Mathematics, Oregon State University, Corvallis OR, USA.

1996–1997: Visiting Associate Professor, Department of Computer Science, University of Utah, Salt Lake City (on leave from OSU).

1999–present: Professor, Department of Applied Mathematics, University of Stellenbosch, RSA.

PUBLICATIONS

1. M Fasoldini, B Fornberg, JAC Weideman, “A computational exploration of the McCoy-Tracy-Wu solutions of the third Painlevé equation,” *Physica D*, **363**, pp. 18–43 (2018)
2. JAC Weideman, “Annie@60: A life in approximation,” *Dolomite Research Notes in Approximation*, **10**, pp. 1–5 (2017) (Summary of the invited plenary address delivered in honour of the 60th birthday celebrations of Professor Annie Cuyt (Antwerp).)
3. M Fasoldini, B Fornberg, JAC Weideman, “Methods for the computation of the multivalued Painlevé transcendents on their Riemann surfaces,” *Journal of Computational Physics*, **344**, pp. 36–59 (2017)
4. N Hale, JAC Weideman, “Contour Integral Solution of Elliptic PDEs in Cylindrical Domains,” *SIAM Journal on Scientific Computing*, **37**, pp. A2630–A2655 (2015)

5. B Fornberg, JAC Weideman, “A Computational Overview of the Solution Space of the Imaginary PII Equation,” *Physica D*, **309**, pp. 108–118 (2015)
6. B Dingfelder, JAC Weideman, “An Improved Talbot Method for Numerical Laplace Transform Inversion,” *Numerical Algorithms*, **68**, pp. 167–183 (2015)
7. T Driscoll, JAC Weideman, “Optimal Domain Splitting for Interpolation by Chebyshev Polynomials,” *SIAM Journal on Numerical Analysis*, **52**, pp. 1913–1927 (2014)
8. LN Trefethen, JAC Weideman, “The Exponentially Convergent Trapezoidal Rule,” *SIAM Review*, **56**, pp. 385–458 (2014)
9. B Fornberg, JAC Weideman, “A Computational Exploration of the Second Painlevé Equation,” *Foundations of Computational Mathematics*, **14**, pp. 985–1016 (2014)
10. B Fornberg, JAC Weideman, “A Numerical Methodology for the Painlevé Equations,” *Journal of Computational Physics*, **230**, pp. 5957–5973 (2011)
11. K in’t Hout, JAC Weideman, “A Contour Integral Method for the Black–Scholes and Heston Equations,” *SIAM Journal on Scientific Computing* **33**, pp. 763–785 (2011)
12. JAC Weideman, “Improved Contour Integral Methods for Parabolic PDEs,” *IMA Journal of Numerical Analysis*, **30**, pp. 334–350 (2010)
13. PL Nash, JAC Weideman, “High Accuracy Representation of the Free Propagator,” *Applied Numerical Mathematics*, **59**, pp. 2937–2949 (2009)
14. J van Deun, K Deckers, A Bultheel, JAC Weideman, “Algorithm 882: Near Best Fixed Pole Rational Interpolation With Application in Spectral Methods,” *ACM Transactions on Mathematical Software*, **35**, pp. 14:1–14:21 (2008)
15. JAC Weideman, LN Trefethen, “Parabolic and Hyperbolic Contours for Computing the Bromwich Integral,” *Mathematics of Computation*, **76**, pp. 1341–1356 (2007)
16. JAC Weideman, LN Trefethen, “The Kink Phenomenon in Féjer and Clenshaw-Curtis Quadrature,” *Numerische Mathematik*, **107**, pp. 707–727 (2007)
17. JAC Weideman, “Optimizing Talbot’s Contours for the Inversion of the Laplace Transform,” *SIAM Journal on Numerical Analysis*, **44**, pp. 2342–2362 (2006)
18. K Driver, H Prodinger, C Schneider, JAC Weideman, “Padé approximation to the logarithm III: Alternative Methods and Additional Results,” *Ramanujan Journal*, **12**, pp. 299–314 (2006)
19. K Driver, H Prodinger, C Schneider, JAC Weideman, “Padé approximation to the logarithm II: Identities, recurrences and symbolic computation,” *Ramanujan Journal*, **11**, pp. 375–390 (2006)
20. JAC Weideman, “Spectral Differentiation Matrices for the Numerical Solution of Schrödinger’s Equation,” *Journal of Physics A: Mathematics and General*, **3**, pp. 10229–10237 (2006)
21. LN Trefethen, JAC Weideman, T Schmelzer, “Talbot Quadratures and Rational Approximations,” *BIT Numerical Mathematics*, **46**, pp. 653–670 (2006)
22. SC Reddy, JAC Weideman, “The Accuracy of the Chebyshev Differencing Method for Analytic Functions,” *SIAM Journal on Numerical Analysis*, **42**, pp. 2176–2187 (2005)
23. JAC Weideman, “Padé Approximations to the Logarithm I: Derivation via Differential Equations,” *Quaestiones Mathematicae* **28**, pp. 375–390 (2005)

24. JAC Weideman, "Computing the Dynamics of Complex Singularities of nonlinear PDEs," *SIAM Journal on Applied Dynamical Systems*, **2**, pp. 171–186 (electronic) (2003)
25. JAC Weideman, "Numerical Integration of Periodic Functions: A Few Examples," *American Mathematical Monthly*, **109**, pp. 21–36 (2002)
26. JAC Weideman, DP Laurie, "Quadrature Rules Based on Partial Fraction Expansions," *Numerical Algorithms*, **24**, pp. 159–178 (2000)
27. JAC Weideman, SC Reddy, "A MATLAB Differentiation Matrix Suite," *ACM Transactions of Mathematical Software*, **26**, pp. 465–519 (2000)
28. W Black, JAC Weideman, BM Herbst, "A note on an integrable discretization of the nonlinear Schrödinger equation," *Inverse Problems*, **15**, pp. 807–810 (1999)
29. JAC Weideman, "Algorithms for parameter selection in the Weeks method for inverting the Laplace transform," *SIAM Journal on Scientific Computing*, **21**, pp. 111–128 (1999)
30. JAC Weideman, "Spectral methods based on nonclassical orthogonal polynomials," in *International Series of Numerical Mathematics*, **131**, pp. 239–251 (1998)
31. JAC Weideman, BM Herbst, "Finite difference methods for an AKNS eigenproblem," *Mathematics and Computers in Simulation*, **43**, pp. 77–88 (1997)
32. JAC Weideman, "Computing the Hilbert transform on the real line," *Mathematics of Computation*, **64**, pp. 745–762 (1995)
33. PW White, JAC Weideman, "Numerical simulation of solitons and dromions in the Davey-Stewartson system," *Mathematics and Computers in Simulation*, **37**, pp. 469–479 (1994)
34. JAC Weideman, "Computation of the complex error function," *SIAM Journal on Numerical Analysis*, **31**, pp. 1497–1518 (1994). A production error involving the figures was corrected in *SIAM Journal on Numerical Analysis* **32**, pp. 330–331 (1995)
35. A Clout, JAC Weideman, "An adaptive algorithm for spectral computations on unbounded intervals," *Journal of Computational Physics*, **102**, pp. 398–406 (1992)
36. JAC Weideman, "The eigenvalues of Hermite and rational spectral differentiation matrices," *Numerische Mathematik*, **61**, pp. 409–431 (1992)
37. MJ Ablowitz, BM Herbst, JAC Weideman, "Dynamics of semi-discretizations of the defocusing nonlinear Schrödinger equation," *IMA Journal of Numerical Analysis*, **11**, pp. 539–552 (1991)
38. LN Trefethen, JAC Weideman, interpolation in equally spaced points," *Journal of Approximation Theory*, **65**, pp. 247–260 (1991)
39. JAC Weideman, A Clout, "Spectral methods and mappings for evolution equations on the infinite line," *Computer Methods in Applied Mechanics and Engineering*, **80**, pp. 467–481 (1990)
40. A Clout, BM Herbst, JAC Weideman, "A numerical study of the cubic-quintic Schrödinger equation," *Journal of Computational Physics*, **86**, pp. 127–146 (1990)
41. JAC Weideman, LN Trefethen, "The eigenvalues of second-order spectral differentiation matrices," *SIAM Journal on Numerical Analysis*, **25**, pp. 1279–1298 (1988)
42. JAC Weideman, BM Herbst, "Recurrence in semi-discrete approximations of the nonlinear Schrödinger equation," *SIAM Journal of Scientific and Statistical Computing*, **8**, pp. 988–1004 (1987)

43. JAC Weideman, BM Herbst, “Split-step methods for the solution of the nonlinear Schrödinger equation,” *SIAM Journal on Numerical Analysis*, **23**, pp. 485–507 (1986)
44. BM Herbst, AR Mitchell, JAC Weideman, “On the stability of the nonlinear Schrödinger equation,” *Journal of Computational Physics*, **60**, pp. 263–281 (1985)

INVITED KEYNOTE PRESENTATIONS AT CONFERENCES

1. Laplace Transform Methods and Their Applications, National Institute for Mathematical Sciences, Daejeon, Korea, October 2011
2. South African Symposium on Numerical and Applied Mathematics, University of the Witwatersrand, Johannesburg, April 2012
3. South African Symposium on Numerical and Applied Mathematics, University of Pretoria, Pretoria, April 2015
4. New Directions in Numerical Computing, Oxford University, England, August 2015
5. 4th Dolomite Conference on Constructive Approximation, Dolomite Research Centre, Alba di Canazei, Italy, September 2016

RESEARCH GRANTS

1. NSF Grant DMS-9404599 (USA), 1994–1996
2. Several NRF Grants (South Africa) 1999–current
3. British Royal Society award (support scheme for developing countries) 2006
4. London Mathematical Society travel award 2009

TEACHING & POSTGRADUATE SUPERVISION

Only Stellenbosch University statistics listed here (not for earlier positions at OSU or the UFS):

Undergraduate Courses Taught: TW214 (Applied Linear Algebra), TW244 (Applied Differential Equations), TW324 (Numerical Methods), TW364 (Applied Fourier Analysis), TWB264 (Advanced Mathematical Methods for Engineers), NM262 (Numerical Methods for Engineers)

Postgraduate Courses Taught: TW781 (Analytical Methods of Applied Mathematics), TW776 (Numerical Methods), TW834 (Partial Differential Equations for Engineers)

Curriculum Development: TW364, TW781, TW776 (all three developed from scratch), and TWB264 (developed in collaboration with colleagues at Engineering and Applied Math).

MSc Students: Fernando Nieuwveldt, Gert Wessels (both completed 2008), Edgard Ngounda (completed 2009), Eyaya Eneyew (completed 2011), Chinenye Assumpta Nnakenyi (AIMS, completed 2015), Gerhard Kirsten (completed 2018)

PhD Students: Marco Fasoldini (externally supervised at the UFS, completed degree in 2018)

Postdoctoral Fellow: Nick Hale (D. Phil, Oxford) 2014–2015

External Examiner (international): PhD, University of Tasmania (2005), PhD, University of Arizona (2005), DPhil, Oxford University (2009, 2013, 2017).

SERVICE

1. Co-organizer of the South African Numerical and Applied Mathematics Symposium (SANUM) in 1999-2011, 2013, 2016, 2018
2. Panel member for the senior section of the SA Math Olympiad, 2008–2012 (chair 2010–2012).
3. Reviewer for top rated international journals (SIAM, IMA, Royal Society, ACM, etc.)
4. Book reviewer for the Society of Industrial and Applied Mathematics and Springer.
5. Reviewer for local and international grant agencies (NRF in SA, NSF in USA, Swiss NSF, Belgian FWO, French ISITE–BFC).
6. Consulted by appointment committees for senior level positions (USA, Canada, Korea).
7. Associate editor for *Electronic Transactions in Numerical Analysis* and *Numerical Algorithms* (international) and editorial board member for *Quaestiones Mathematica* (national).
8. Member of the SIAM¹ committee on Committees and Appointments.

MISCELLANEOUS DISTINCTIONS

1. Visiting Fellow, Exeter College, Oxford University, 2004–5.
2. NRF B2-rated researcher (1999, 2004, 2009) and B1 (2015)
3. Stellenbosch University Vice-Chancellor’s award for excellence in teaching (2002) and research (2005, 2010).
4. Elected to the *Suid-Afrikaanse Akademie vir Wetenskap en Kuns*, 2006.
5. Elected as Fellow of SIAM in 2017 (“For powerful and elegant algorithms derived from complex analysis.”)

IN THE FUTURE

1. Invited speaker at the ICIAM² meeting that will be held in July 2019 in Valencia, Spain.
2. Invited speaker at the 3rd BRICS³ meeting on Mathematics and Statistics to be held in July 2019 in Kazan, Russia.
3. One of five international co-organizers of a research programme “Complex Analysis: Techniques, Applications and Computations,” scheduled for September to December, 2019. This will be held at the Isaac Newton Institute for Mathematical Sciences in Cambridge, UK.

¹SIAM = Society for Industrial and Applied Mathematics

²ICIAM = International Congress of Industrial and Applied Mathematics

³BRICS = Brazil, Russia, India, China, South Africa